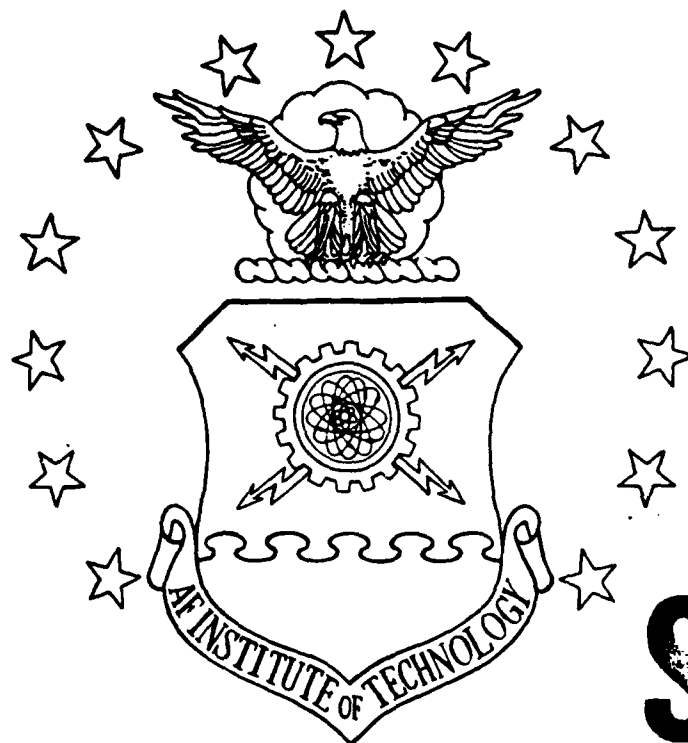


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SHOULD ENTRY-LEVEL MAINTENANCE  
OFFICERS IN MILITARY AIRLIFT COMMAND  
BE MORE TECHNICALLY OR  
ADMINISTRATIVELY ORIENTED?

THESIS

Michael E. Privette  
Captain, USAF

AFIT/GLM/LSM/88S-58

DEPARTMENT OF THE AIR FORCE  
AIR UNIVERSITY  
**AIR FORCE INSTITUTE OF TECHNOLOGY**

Wright-Patterson Air Force Base, Ohio

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THESIS

Presented to the Faculty of the School of Systems and Logistics  
of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the  
Requirements for the Degree of  
Master of Science in Logistics Management

Michael E. Privette, B.S.

Captain, USAF

September 1988

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## Preface

The purpose of this study was to determine whether aircraft maintenance personnel in Military Airlift Command prefer entry-level maintenance officers to possess more technical or administrative characteristics. A survey was used to learn the respondents' preferences. Although some problems surfaced with the survey instrument, results indicated that technical characteristics were generally preferred over administrative.

I wish to thank Lt Col Gary Belmont for the advice I should have taken in the first place. I am indebted to my advisor, Maj Phil Miller, for allowing me to learn from my mistakes and for helping along the way. I also wish to thank Maj Miller and Lt Col Richard Moore for their sound advise and personal assistance throughout the trials and tribulations of the program. Thanks to Capt Jerry Frisbee and Capt Nancy Frye who contributed greatly in developing the survey and provided moral support. Finally, I wish to dedicate this effort to my family. They have suffered the most for it.

Michael E. Privette



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Abstract

The purpose of this study was to determine whether Military Airlift Command (MAC) aircraft maintenance personnel prefer entry-level maintenance officers to possess more technical or administrative characteristics. The study had three primary objectives. First was to determine whether MAC maintenance personnel as a group prefer entry-level maintenance officers to possess more technical or administrative characteristics. The second objective was to determine if entry-level maintenance officers' superiors and subordinates value different characteristics. The final objective was to determine if the preference for technical or administrative characteristics varied among several subgroups. Surveys were sent to DCMs, maintenance squadron commanders, maintenance supervisors, maintenance superintendents, branch chiefs, and shop/flight chiefs.

Analyses of the surveys led to conflicting conclusions. Problems with the survey instrument made the results somewhat questionable. The most reliable section of the survey showed there was no difference in the preferences of any of the groups. All groups favored maintenance officers who were slightly more technically than administratively oriented. Other survey sections indicated varying degrees

of preference for technical characteristics between the groups with one group demonstrating no preference.

Recommendations included improving the survey instrument and surveying entry-level maintenance officers themselves as well as the original groups. Additionally, senior base-level maintenance officers should communicate their wishes for technical proficiency to entry-level maintenance officers under their control. This would lessen the frustration new MAC maintenance officers face since many senior officers seem to be emphasizing administrative duties at the expense of technical competence.

SHOULD ENTRY-LEVEL MAINTENANCE OFFICERS  
IN MILITARY AIRLIFT COMMAND  
BE MORE TECHNICALLY OR ADMINISTRATIVELY ORIENTED?

I. Introduction

General Issue

The general description of an aircraft maintenance officer's duties and responsibilities as stated in AFR 36-1 is very broad and vague. This leads to a wide variety of interpretations of just what a maintenance officer's job is all about. As a result of the various interpretations, the entry-level maintenance officer is often frustrated because of the confusion about what characteristics he is expected to possess. For this study, the characteristics of interest are divided into two broad categories of technical and administrative traits. The aim of this research is to determine whether Military Airlift Command (MAC) aircraft maintenance people feel the ideal maintenance officer should be more technically or administratively oriented. This information may contribute to a better defined set of duties and responsibilities based on these perceived ideal maintenance officer characteristics.

Specific Problem

Each major command wants its maintenance officers to

possess certain distinct characteristics. Additionally, maintenance personnel at different levels of responsibility have different ideas about the characteristics an entry-level maintenance officer should have. An entry-level maintenance officer in MAC is often torn between what his superiors demand of him and the characteristics his subordinates expect him to exhibit. These two groups seem to have different ideas about which characteristics an ideal maintenance officer should possess. This thesis is an attempt to uncover the characteristics MAC maintenance personnel value and whether people at various positions in base-level maintenance prefer different characteristics.

#### Research Objectives

This research had three primary objectives. First was to determine whether MAC aircraft maintenance personnel as a group prefer entry-level maintenance officers to possess more technical or administrative characteristics. The second objective was to determine if entry-level maintenance officers' superiors and subordinates value different characteristics. The final objective was to determine if the preference for technical or administrative characteristics varied among subgroups ranging from Deputy Commanders for Maintenance (DCM) to shop or flight chiefs.

### Investigative Questions

To accomplish the objectives stated above, the following questions were investigated:

1. Do Military Airlift Command aircraft maintenance supervisory personnel prefer entry-level maintenance officers to possess more administrative or technical characteristics?
2. Do their superiors prefer entry-level maintenance officers to possess more administrative or technical characteristics?
3. Do their subordinates prefer entry-level maintenance officers to possess more administrative or technical characteristics?
4. Is there a difference in preference between certain subgroups of superiors and subordinates? What are the differences?

### Scope

Data for this research were collected through a survey of personnel from 13 Military Airlift Command wings in the continental United States (CONUS). The 375th Aeromedical Airlift Wing at Scott AFB, Illinois was omitted because most of its aircraft maintenance functions are performed by civilian contractors. Due to time constraints, no overseas MAC installations were surveyed. Two other theses used the same survey to answer similar investigative questions

pertaining to Strategic Air Command (AFIT/GLM/LSM/88S-21) and Tactical Air Command (AFIT/GLM/LSM/88S-22).

The information from the MAC survey was used to determine the preference of base-level maintenance people for technically or administratively oriented entry-level maintenance officers. The research was conducted at three levels. The first level addressed the overall preference of base-level maintenance supervisory personnel in CONUS MAC assignments. The second level compared the feelings of entry-level maintenance officers' superiors and subordinates. The third contrasted the preferences of six subgroups which included DCMs and assistant DCMs, maintenance squadron commanders, squadron maintenance supervisors, squadron maintenance superintendents, branch chiefs, and shop and flight chiefs.

#### Definitions

Key terms are defined as follows:

1. Entry-level Maintenance Officers (MOs) are typically lieutenants or junior captains serving in their first base-level aircraft maintenance assignments. These people are normally serving as Officer in Charge (OIC) or assistant OIC of a maintenance branch.

2. Superiors are maintenance officers serving in positions above branch level and include DCMs, squadron commanders, and maintenance supervisors. Any reference to DCMs is meant to include assistant DCMs as well.

3. Subordinates are noncommissioned officers (NCOs) serving in positions at or below branch level and include branch, shop, and flight chiefs. Since they are NCOs, squadron maintenance superintendents are considered in this category. However, they are assigned in the base-level hierarchy at a level of responsibility above that of entry-level MOs. All further references to shop chiefs should be understood to include flight chiefs as well since the two groups are essentially at the same hierarchical level in different organizations.

4. Supervisory personnel are any of the people serving in positions from shop chief to DCM.

5. Technical pertains to skills and knowledge related to servicing and maintaining aircraft and support equipment and to directly managing those operations.

6. Administrative pertains to skills and knowledge related to processing paperwork, conducting awards programs, and similar functions not directly related to maintaining aircraft and support equipment.

### Background

Attachment 13 to Air Force Regulation 36-1 describes the duties and responsibilities of an aircraft maintenance officer (MO). Both administrative and technical duties are listed in the regulation. The MO 'provides technical advice on the identification of defects' (2:A13-15) and 'provides technical advice in determining the nature and extent of



repairs to aircraft" (2:A13-15). These duties clearly fall into the technical category. The administrative category includes responsibilities such as preparing "staff studies and reports on maintenance matters" (2:A13-15), and ensuring "correct administration of manhour documentation, maintenance data collection, and maintenance information systems" (2:A13-15). The regulation mentions over 30 different maintenance officer duties and responsibilities. Most are of a technical nature, and even the administrative duties require the MO to have some degree of technical competence to perform them adequately. Knowledge requirements are especially weighted toward emphasizing technical characteristics.

Knowledge of the following is mandatory: maintenance management procedures and organizational and mission requirements; capabilities, limitations, and basic operating principles of airplane general, accessories, propulsion, and avionics systems and components; theory of flight; principles of airframe construction to include fabrication activities; basic knowledge of munitions, munitions procedures, and quality control or assurance; principles of aircraft, avionics, and munitions systems interrelationships; and basic knowledge of supply, transportation, POL, civil engineering, and other unit activities operations and procedures as they relate to aircraft, avionics, or munitions maintenance units [2:A13-15].

The entry-level maintenance officer clearly needs to be competent in both administrative and technical abilities to satisfy the requirements of AFR 36-1. However, problems arise when the MO's superiors place their greatest emphasis on the MO developing administrative abilities while subordinates expect the MO to be more technically oriented.

Based on the author's experience and informal discussions with many other MAC entry-level MOs, this seems to be the dilemma many new maintenance officers experience in Military Airlift Command.

Although this particular research breaks new ground in the area of Air Force aircraft maintenance, studies by various behavioral scientists investigated the relationships between superiors' and subordinates' attitudes about middle managers in other fields. Related research includes investigations of multi-constituency views of organizational effectiveness. Additionally, some studies analyzed performance appraisals from either the superior or subordinate perspective. This section incorporates a review of relevant literature on these subjects.

Connolly and others stated, 'We argue that an answer to the question 'How well is entity X performing?' is inevitably contingent on whom one is asking' (1:212). Their point is that various constituencies, people with different perspectives based on their functional relationship to entity X, have different opinions about that entity's performance. 'In general, the multiple-constituency approach asks: What constituencies exist in a particular setting' (1:212)? The constituencies in this research are the various sub-populations including superiors, subordinates, maintenance supervisors, flight chiefs, etc.. The second question of the multiple-constituency model is,

'What effectiveness assessments does each now reach?'

(1:216). Although this thesis is not concerned with constituencies' perceived effectiveness of entry-level maintenance officers (entity X), it examines perceived importance of certain characteristics. Since Connolly showed different constituencies have different views about an entity's effectiveness, it is logical to assume different constituencies desire different characteristics in entry-level MOs. Connolly also concluded there are 'opportunities for constituencies to affect the organization' (1:216). Clearly, the various sub-populations of this study may affect the entry-level MO in a variety of ways. It is critical to determine whether each constituency prefers administrative or technical characteristics to understand the opposing forces acting on the typical entry-level MO in MAC.

In their study of personnel department activities from a multiple constituency perspective, Tsui and Milkovich essentially supported Connolly's findings. Not only did they find different viewpoints existed from group to group, but they discovered the 'largest differences were between the two constituencies most distant in the organization hierarchy' (15:533-534). Accordingly, the greatest difference in characteristic preference across the sub-populations of this thesis should be between DCMs and shop

chiefs. They are the two constituencies farthest apart in the base-level maintenance hierarchy.

In a 1980 literature review, Landy and Farr found that:

Individuals with more knowledge of the requirements of the particular job have been found to be less influenced by serial position (Wagner & Hoover, 1974) and to more validly predict future performance (Amir, Kovarsky, & Sharan, 1970) than individuals with less knowledge of the job requirements [7:77].

According to Landy and Farr's research, a supervisor must have a reasonable knowledge of his subordinates' job to be an effective rater and to predict a subordinate's future performance (8:77-78). Since aircraft maintenance is a highly technical career field, entry-level maintenance officers obviously must strive to learn the technical aspects of the job to rate their subordinates fairly.

Tsui investigated the differences between superiors' and subordinates' attitudes about middle manager roles in an organization. In her work on role set analysis of managerial reputation, she maintained a manager's reputation for effectiveness is dependent upon different constituencies' viewpoints. A superior's feeling on the importance of a middle manager's attribute does not always agree with a subordinate's belief. Parts of Tsui's study nearly parallel the efforts of this research to establish and measure the differences between various constituents' feelings about certain MO characteristics. Tsui discovered middle managers 'indeed were found to be presented with different expectations or demands from their superiors (and)

subordinates' (14:90). In a quote from Salancik and others (1975), Tsui showed that supervisors develop characteristics to satisfy demands imposed on them by their superiors and subordinates (14:67+). One could easily infer from her study that an aircraft maintenance officer's supervisors and subordinates will demand the MO display technical and administrative characteristics in varying degrees. The MO will then develop the appropriate characteristics to satisfy those demands. The characteristic each constituent would prefer and the extent of preference is unpredictable.

A 1984 study by Mount investigated subordinate ratings of managerial performance. Mount surveyed middle level managers, their supervisors and subordinates in a high technology corporation. Each respondent rated the manager with whom she was functionally aligned. A nine point rating scale was used with one being the lowest performance and nine the highest. Two of the eight categories were know-how and administration. Know-how was defined as 'serving as a resource person on whom others can rely for technical advice,' and administration was defined as 'processing paper work quickly, accurately, and with close attention to important details' (11:690). The survey results indicated subordinates were much less pleased with the know-how of the managers than the manager's supervisors were. Conversely, subordinates rated managers higher in administrative functions than supervisors did (11:689+). Since

subordinates have a better understanding of the technical aspects of the job than superiors do, their rating is probably a more accurate reflection of the manager's know-how. Just the opposite is likely to be true for rating administrative activities. Therefore, one might expect subordinates to value technical over administrative characteristics in an entry-level maintenance officer. Additionally, superiors would be expected to value administrative characteristics more than technical.

#### Summary

This section introduced a problem faced by entry-level maintenance officers in Military Airlift Command. MAC entry-level MOs feel caught between the expectations of their superiors and their subordinates. Many have encountered superiors' demands for administrative competency at the expense of technical expertise. They become frustrated as they try to meet their superiors' demands while also trying to satisfy the expectations of their subordinates who generally desire MOs to be more technically proficient.

An analysis of the literature indicates differences exist between superiors' and subordinates' expectations of middle managers in the civilian sector. It seems logical that the studies should also apply to the military environment. According to the literature, one should suspect that the differences in expectations will vary with

position in the organizational hierarchy. Additionally, the greatest variance should appear between the constituencies at opposite ends of the hierarchy.

This thesis attempts to quantify and analyze aircraft maintenance supervisors' expectations of entry-level maintenance officers in the areas of technical and administrative proficiency. Specific groups considered were DCMs and assistant DCMs, maintenance squadron commanders, squadron maintenance supervisors, squadron maintenance superintendents, branch chiefs, and shop and flight chiefs. The top three hierarchical constituencies were also grouped together and analyzed as superiors and the others grouped together and analyzed as subordinates. The next section describes the methodology used to collect and analyze the data necessary for this research.

## II. Methodology

### Justification of Survey

A thorough review of existing records was conducted to determine if any research on this subject had been done previously. Although a number of distinguished researchers have studied situations moderately related to this thesis topic, no data that would answer the thesis research questions were found. Therefore, creation of a new survey instrument was justified (12:53).

### Instrument

The survey was made up of 65 questions divided into 8 sections. Section 1 consisted of eight demographic questions. The remaining 57 questions were distributed throughout the other 7 sections. The questions in Sections 2, 3, 6, and 7 were designed to yield nominal data, while Section 4 generated ordinal data responses. Interval scale data were returned by Section 5 and 8 responses (5:85). Table 1 provides a more thorough description of each section. The easy to answer demographic questions were presented first to "encourage response and promote rapport" (4:206). Since the Federal Office of Management and Budget recommends surveys take less than half an hour to complete, the survey was designed so that respondents needed only approximately 30 minutes to answer all the questions (5:105).



Table 1. Section Description and Data Classification

Section	Questions	Description	Data Level
1	4- 8	Multiple Choice	Nominal
2	9-13	Two-Way	Nominal
3	14-16	Multiple Choice	Nominal
4	17-38	Rank Order	Ordinal
5	39-48	5-pt Likert Scale	Interval
6	49-59	Two-Way	Nominal
7	60-61	Multiple Choice	Nominal
8	62-65	5-pt Likert Scale	Interval

The survey isolated several variables for this study. The dependent variable was the extent the respondent group favored technical or administrative characteristics in entry-level maintenance officers. Independent variables were the levels of responsibility of the respondents. The overall base-level CONUS MAC attitude was the single independent variable in the first case. In another case, the independent variables were points of view of superiors and subordinates. Independent variables in the third case were the feelings of each of the subgroups (i.e. shop chiefs, squadron commanders, etc.).

The validity of the survey instrument was ensured through several pretest activities. The original version

was given to other Air Force Institute of Technology (AFIT) students who were encouraged to comment about question clarity and response options. As a result of constructive criticism, several questions were changed to make the survey easier to understand. Next, the survey was administered to 18 aircraft maintenance people at various positions in the 4950th Test Wing's maintenance complex. They also suggested a number of ideas for improving the instrument. Additionally, an analysis of their responses indicated problems in the construction of several questions. Those questions were either modified or eliminated from the survey. As a final audit, non-maintenance AFIT students read the survey to check for clarity and understandability. The instrument was reviewed by the AFIT Survey Control Officer and the Personnel Survey Branch at the Air Force Military Personnel Center (3:3). A copy of the survey instrument is attached in Appendix A.

#### Population

The population of interest consisted of all base-level enlisted, civilian, and commissioned supervisors in the aircraft maintenance field at 13 CONUS MAC wings. Of the 13 maintenance organizations, 10 were structured in accordance with MAC Regulation 66-1, Maintenance Management. Figures 1 through 4 display the standard MACR 66-1 structure (10:9-12). One surveyed organization was similarly structured but did not include an Avionics Maintenance Squadron. Avionics

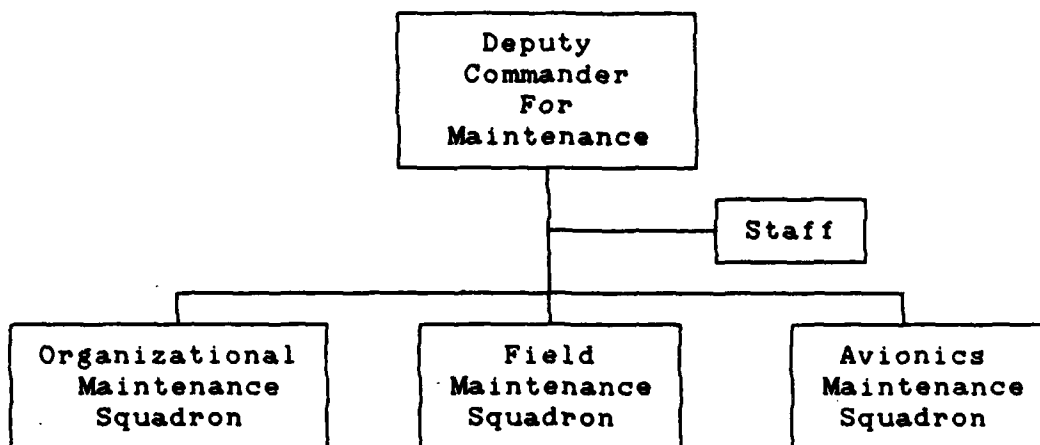


Figure 1. MACR 66-1 Base-Level Organization (10:7)

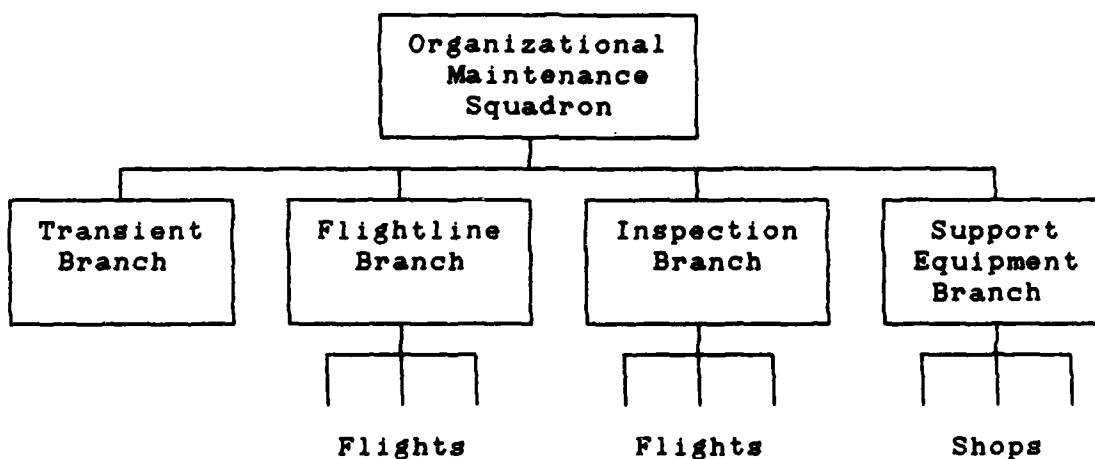


Figure 2. Organizational Maintenance Squadron (10:10)

maintenance was performed at branch level within the Field Maintenance Squadron (FMS). Two others were organized as Consolidated Aircraft Maintenance Squadrons (CAMS). CAMS organizations are structured as shown in Figure 5. Table 2 presents a distribution by sub-population of the 647 population elements.

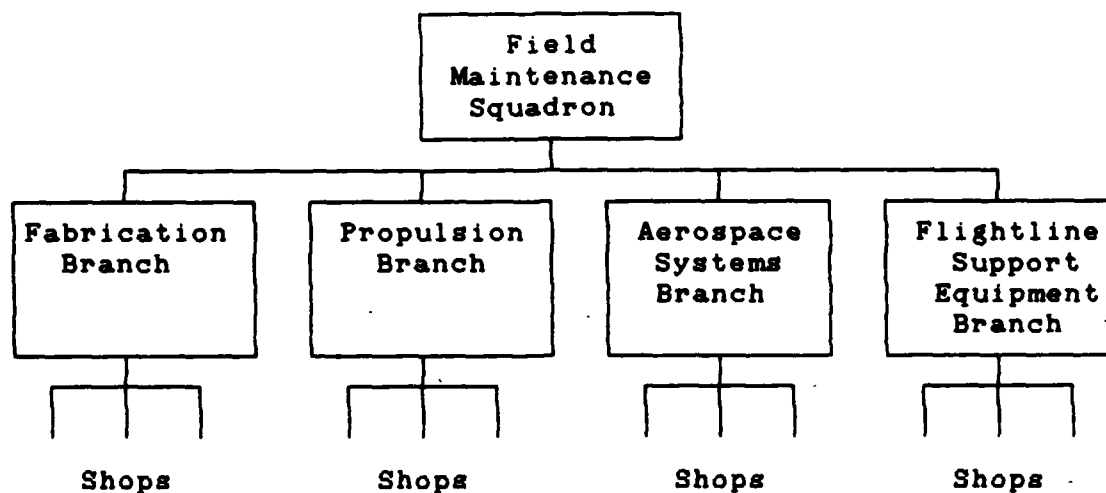


Figure 3. Field Maintenance Squadron (10:9)

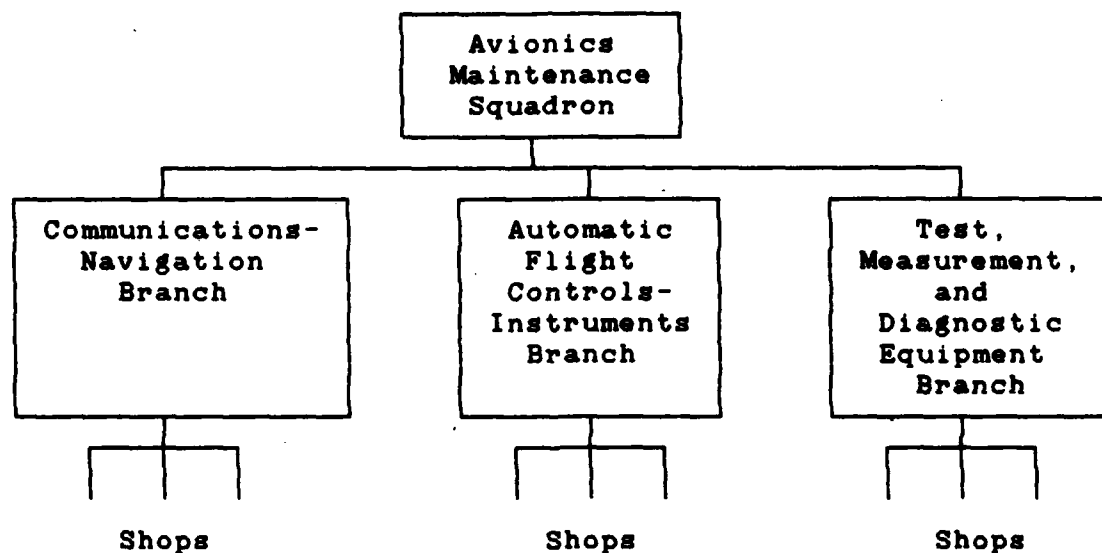


Figure 4. Avionics Maintenance Squadron (10:11)

#### Sample

Surveys were mailed to 224 maintenance supervisory personnel. The sampling distribution is shown in Table 2. Since the return rate for AFIT surveys is normally between

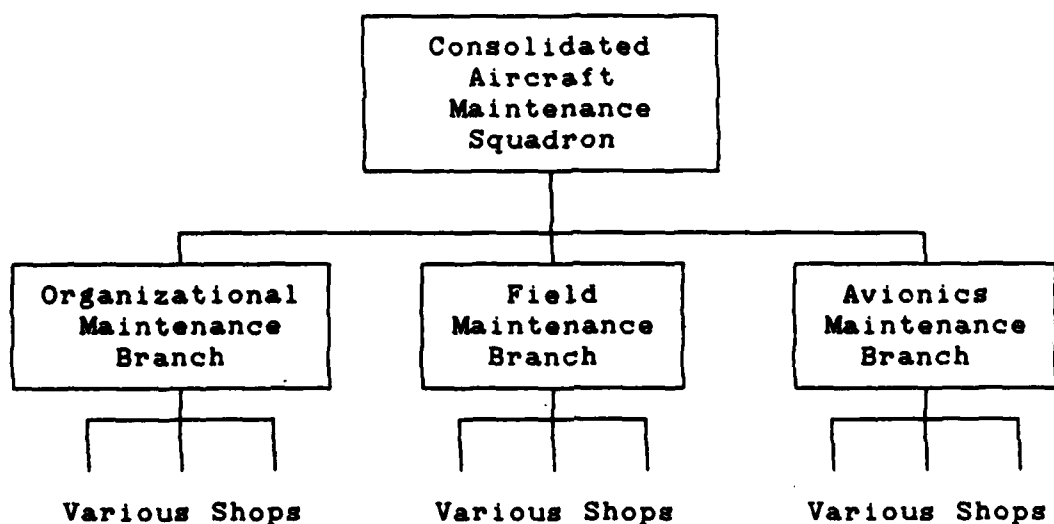


Figure 5. CAMS Organizational Chart (10:12)

Table 2. Population and Sample Sizes by Sub-Population

SUB-POPULATION	POPULATION SIZE	SAMPLE SIZE
DCM / Asst DCM	22	22
Squadron Commander	34	34
Maintenance Supervisor	34	34
Maintenance Superintendent	34	34
Branch Chief	127	50
Shop Chief / Flight Chief	396	50
TOTALS	647	224

65 and 75 percent (16), 50 was chosen to be the sample size for each sub-population. Even at a 60 percent return rate, an initial sample of 50 would yield 30 responses which is

enough to perform large sample size statistical tests. Additionally, literature indicates that a sample size of 50 produces an accurate representation of any size survey population. Larger samples do not contribute significantly to the reliability of the data obtained from the survey (12:324).

The 50 shop chiefs and 50 branch chiefs were selected at random from their respective sub-populations. Since all the other sub-populations were smaller than 50, surveys were sent to a census of DCMs and assistants, squadron commanders, maintenance supervisors, and maintenance superintendents. This type of disproportional stratified sampling has the advantage 'that all the strata are equally reliable from the point of view of the size of sample. Hence when an equal number of cases is taken from each stratum, comparisons of the different strata are facilitated' (12:228). Therefore, the stratified samples were representative of the various sub-populations. However, the results of this research are not generalizable beyond the previously defined population.

#### Data Collection Plan

All 224 survey packages were mailed from the Air Force Institute of Technology (AFIT) on 25 February 1988. Each package contained a survey, an optical scan response sheet, and a return envelope. The survey packages were addressed to organizational positions rather than individuals' names.

This was done to promote an atmosphere of anonymity for the respondents. Although respondents were asked to return the surveys by 31 March 1988, completed surveys were accepted until 1 May 1988 which was the survey expiration date (7).

An optical scanner read the survey responses into a computer data bank. SAS programs were written to separate the data based on certain respondent demographics. One output contained responses from all categories of respondents. Two other programs yielded response data from superiors and subordinates. Six separate programs printed out the responses of each sub-population sample. A final pair of programs provided survey data from respondents who had been in MAC for less than three years and from those who had been in the command for more than three years.

#### Statistical Tests

Data were analyzed using a number of parametric and nonparametric procedures. Since most of the data were nominal scale, relative frequency histograms and chi square tests for single, two independent, and k independent samples were performed (13:42+). Parametric tests included z-tests for the differences between means and nonparametric testing was contingency table analyses (9:293+). Sections 1 and 6 were excluded from the following tests except where their use was specifically mentioned. Section 1 was all demographics, and Section 6 responses did not contribute one way or the other to the research, so they were not

considered in the analyses. Section 8 questions were unique in that they asked the respondents directly if they preferred entry-level MOs to be more technically or administratively oriented. This is important since there is no doubt about whether the responses should be classified as preferring technical or administrative characteristics. Although most of the other survey sections' responses are fairly clear as to their orientation, some could be debated. Therefore, Section 8 provides the most definitive indication of characteristic preferences in the survey. These responses were compared with the responses to the general questions for each of the major groups and subgroups as indicated below.

Testing Time-in-MAC Effect. Survey data were divided into two treatments based on time the respondent had been in MAC. One group was less than three years in the command, and the other was three or more years in MAC. A chi square contingency table test was performed to determine whether people with less than three years in MAC had the same preference for technical or administrative characteristics as those who had been in the command longer. A lack of significant difference (at a .05 level) between the two groups would indicate the responses from those with less than three years MAC experience did not skew the data (13:107). Therefore, all responses could be considered in the following analyses.



Comparing Nominal and Interval Data. All data except Section 8 responses were reduced to nominal so the Section 5 (interval) data could be compared with data from the rest of the survey. A chi square contingency table test for two independent samples was performed to determine if the Section 5 information differed from the information generated by the rest of the survey (13:104). A result of no statistically significant difference would have made it possible to perform parametric testing of Section 5 data and generalize the results across the samples.

Test for MAC Preference. A relative frequency histogram was constructed to identify whether the overall sample preference was for administrative or technical characteristics. Additionally, a one-sample chi square test was used to determine sample preference through nonparametric testing (5:362-363). Responses to certain Section 8 questions were compared to the chi square test results.

Superiors vs Subordinates. Two tests were performed on data from these groups. First, relative frequency histograms using all data were constructed to display the results graphically. Then, a 2 x 2 contingency table of all data was evaluated to determine the significance of the difference between responses of superiors and subordinates (13:104).

### Comparison of the Differences Between Subgroups.

Several tests were performed at this level as well. To learn whether the sub-populations of DCMs through shop and flight chiefs differed in their attitudes about entry-level maintenance officer characteristics, various comparison tests were run. The first step was to create relative frequency histograms to compare the data visually. The chi square test for k independent samples was used to ascertain if all of the groups' responses were essentially the same (13:175). Next, each subgroup was compared with each of the others using the two independent sample chi square test. This yielded an ordering of the groups based on their preferences of characteristics. To find the correlation between position in the base-level maintenance hierarchy and preference for technical or administrative characteristics, all data were converted to nominal and Cramer's statistic was calculated (4:387). Additionally, an analysis of variance (ANOVA) was computed using the interval data from Section 8 (6:55-57).

### Summary

This section explained the rationale behind the use of a survey as the data gathering instrument. The lack of any prior studies in this particular area dictated the creation of a new survey instrument. The chapter also described each section of the survey as well as the validation procedure used to insure meaningful responses. For the purpose of

this research, the population was limited to aircraft maintenance supervisory personnel at 13 MAC wings in the CONUS. The specific groups were DCMs and assistant DCMs, maintenance squadron commanders, maintenance supervisors, maintenance superintendents, branch chiefs, and shop chiefs and flight chiefs. The sample included a census of each group through maintenance superintendent and a random selection of 50 each from the branch chief and shop and flight chief categories.

Survey data were analyzed from a number of perspectives including comparing each of the sub-groups and considering the amount of experience respondents had in the command. Since most data were nominal level, nonparametric tests prevailed. Relative frequency histograms and chi square contingency tables were used most frequently to describe the data and indicate differences between the population sub-groups. The following chapter contains histograms and results of the chi square tests as well as analyses of the tests and some additional observations.

### III. Findings and Analyses

#### Introduction

The first part of this chapter discusses some problems that were inherent in the survey instrument. The reader must be cognizant of these limitations to fully understand the results of the subsequent analyses. The second topic is the survey return rate. Certain problems were encountered with some of the surveys which made them unusable for the primary research. These problems are explained along with a short discussion of how responses on the problem surveys indicated some curious anomalies with the primary research data. The next section explains how the survey data were all converted to nominal level and how counts were taken from each survey section. The majority of this chapter is dedicated to presenting the actual statistical tests described in Chapter II and analyses of the results of those tests.

#### Survey Instrument Problems

The survey instrument was made up of eight individual sections. Section 1 was demographics while the other seven sections were designed to yield data that could be analyzed to determine preferences for technical or administrative characteristics of entry-level maintenance officers. Sections 2 through 7 were to provide data that would indicate respondents' preferences for technical or

administrative skills. The last section (Section 8) was made up of questions that directly asked what characteristics the respondents valued most in their conception of an ideal maintenance officer. Additionally, the respondents were asked what characteristics were most prevalent in the best and worst maintenance officers with whom they had ever worked. A copy of the survey instrument is located in Appendix A. Interpreting responses in this section was straight forward since there was no question whether a particular response indicated a technical, administrative, or neutral preference. However, there appeared to be some problems with the other sections.

First, Section 6 responses were found to contribute nothing to the evaluation of the investigative questions. This section asked whether each item on a list should be required for maintenance officer upgrade to the fully qualified AFSC. Although the information might be useful in some other study, it offered no insight to the problem this thesis was investigating. Therefore, Section 6 responses were not considered in any analyses.

The remaining sections did not support one another. They generated responses that were, in most cases, not consistent with one another. Additionally, Sections 2, 3, and 7 returned only nominal level data which made using parametric tests impossible. The contingency table analysis of the five sections is given below in the statistical

analysis section. It shows that the sections differed considerably from one another in the information they generated. The extreme case was Section 2 which consistently returned indications of strong administrative preferences from each group. This conflicted with the rest of the survey which indicated general support for technical characteristics. The uniqueness of the Section 2 responses might be explained by the nature of the questions. The respondent was forced to choose one of two possible options in each question. One was technically oriented and the other was more administrative in nature. In the first three questions, the technical choice was a "hands on" type of activity while the last two questions offered a technical choice that was at an "understanding" level. The overwhelming majority of respondents avoided the "hands on" type of technical response but often chose the technical responses that were at the understanding level. Administrative characteristics did not meet with the same dichotomy of responses. Respondents seemed to be equally comfortable choosing administrative activities at either level.

The rest of the sections, although they all indicated a preference toward technical characteristics, also did not compare favorably with one another. This may have been a result of the same type of phenomenon discussed above. The possible responses to questions in the various sections

ranged from doing technical activities to understanding some aspect of a technical activity. The differences in the preferences expressed in each section quite probably were a result of different levels of technical characteristics available as options from section to section.

Section 8 response options did not delineate between the levels of technical and administrative characteristics. Therefore, it provided the most clear cut indication of respondents' preferences. The responses of each subgroup from DCM to shop chief were essentially the same. An analysis of variance was performed using the SAS General Linear Models Procedure which compared the means of the responses of each group for three questions. Questions 62 and 63 asked respondents to rate the best and worst maintenance officer they had ever worked with along a 5-point scale of highly technically oriented to highly administratively oriented. The same scale was used for question 65 which asked for the respondents' conception of the ideal maintenance officer. The SAS program showed that for each question there was no difference in responses between any of the groups. Each group rated the best maintenance officer they had ever worked with as being just slightly more technically oriented than administrative. The other sections indicated a much stronger preference for technical characteristics. The respondents' ideal maintenance officer was also slightly more technically

oriented. The worst maintenance officer respondents had worked with was more administratively oriented. Appendix B contains the SAS output and the hypothesis tests for comparing the respondent groups.

Although the data returned by the survey instrument was found to have certain limitations, it was still valuable for comparing the responses of the sample groups. Since each group answered the same survey, the comparisons between the groups were still valid. One should simply keep in mind while reading the following analysis of results that the individual group preferences may indicate a stronger desire for technical characteristics than the respondents may have intended.

#### Return Rate

Of the 224 surveys that were distributed, 181 were returned. This represented a return rate of 81 percent. However, there were a number of surveys that were unusable because they were filled out by the wrong people. In nine cases, the surveys mailed to branch chiefs were answered by officers even though a branch chief is an NCO according to MACR 66-1 (10:7). Since this thesis is concerned with the responses of entry-level maintenance officer's superiors and subordinates, responses from entry-level MOs themselves do not contribute to the research and only confuse the results. Therefore, the responses from the officers answering as branch chiefs were not considered for the primary analyses.



This reduced the number of usable surveys to 172. The officer/branch chiefs' responses added some insight to the general problem, so they were analyzed as a side to the principal study. Their responses differed dramatically with those of both their subordinates and superiors and add credence to the author's original hypothesis that superiors seem to want entry-level MOs to be more administratively oriented. The specific results are presented near the end of this chapter only as items of interest with no claim of scientific validity.

Differences in responses from those who have been in MAC for more than three years were found to be significantly different from those who had been in MAC less than three years. Therefore, surveys from those with less than three

Table 3. Survey Returns by Sub-Population

SUB-POPULATION	SAMPLE SIZE	ORIGINAL USABLE RETURNS	FINAL USABLE RETURNS
DCM / Asst DCM	22	20	19
Squadron Commander	34	27	27
Maintenance Supervisor	34	28	18
Maintenance Superintendent	34	27	23
Branch Chief	50	33	31
Shop Chief	50	37	34
TOTALS	224	172	152

years of MAC experience were not considered in the final analyses and the total usable returns was reduced to 152. Table 3 displays the return rates by population sub-group. Eliminating the officer/branch chief surveys yielded a 77 percent return rate. Disregarding the surveys from respondents with less than three years in MAC dropped the final return rate of usable surveys to 68 percent of the original sample.

#### Counting Nominal Data

In order to perform nonparametric tests over all the survey data and to determine if Section 5 was representative of the whole survey, each section's data had to be converted to a common level. In this case the strongest common level was only nominal. Section 1 was demographics and was not used for any statistical analysis other than to separate the data into groups.

Section 2 questions allowed respondents to choose one of two available answers. One was technical in nature and the other was administrative. Counts for this section were merely the sums of the technical and administrative responses. This section contained five questions.

Section 3 was made up of two multiple choice questions. Each question had six possible responses of which three were administratively oriented and three were technically oriented. Counts were determined in the same manner as in Section 2.

Section 4 was somewhat different. It contained four groups of activities. Within each group, four different activities in which a maintenance officer might be involved were listed. Two of each were technical activities and two were administrative. The respondents were asked to rank order the activities in each group from most important to least important. Counts of technical characteristic preference were determined by adding the number of times technical activities were rated most important. Administrative preference counts were found in a like manner.

Section 5 counts were found by another method. Each item in this section was a statement that a maintenance officer should be better at some task than another. The two contrasted tasks were always one technical and one administrative. The respondents used a 5-point Likert scale to express the extent of their agreement or disagreement with each statement. A response of '1' or '2' to a statement favoring technical ability was counted as a technical preference response. Similarly, a response of '4' or '5' to a statement favoring an administrative skill was also counted as a technical preference. Administrative responses were determined using the same logic. All '3' responses were considered to be neutral and did not figure in the counts. Section 5 had 10 questions.

Section 7 was made up of one multiple choice question. Counts were determined the same way they were in Section 3. Total counts from each survey section were added together for each major group and sub-group. Each group's total count was used for histogram and chi square contingency table analyses.

### Statistical Analyses

Time-in-MAC Effect. Since this thesis was concerned only with Military Airlift Command, it was important to ensure MAC played some role in the preferences expressed by the respondents. Responses from those who had been in MAC less than three years were compared with responses from those who had been in MAC three or more years. As Figure 6 indicates, there was a remarkable difference in preference between respondents who had been in MAC at least three years and those who had spent less time in the command. A chi square test for two independent samples was performed to determine whether the apparent difference between the two groups was statistically significant. The test results were as follows:

$H_0$ : There is no difference in preference for technical or administrative ability between those with less than three years in MAC and those with three or more years in MAC.

$H_a$ : There is a difference in preference between the two groups.

Significance Level: 0.05, with 1 degree of freedom

Critical Test Value: 3.84

# TIME IN MAC EFFECT ON RESPONSES

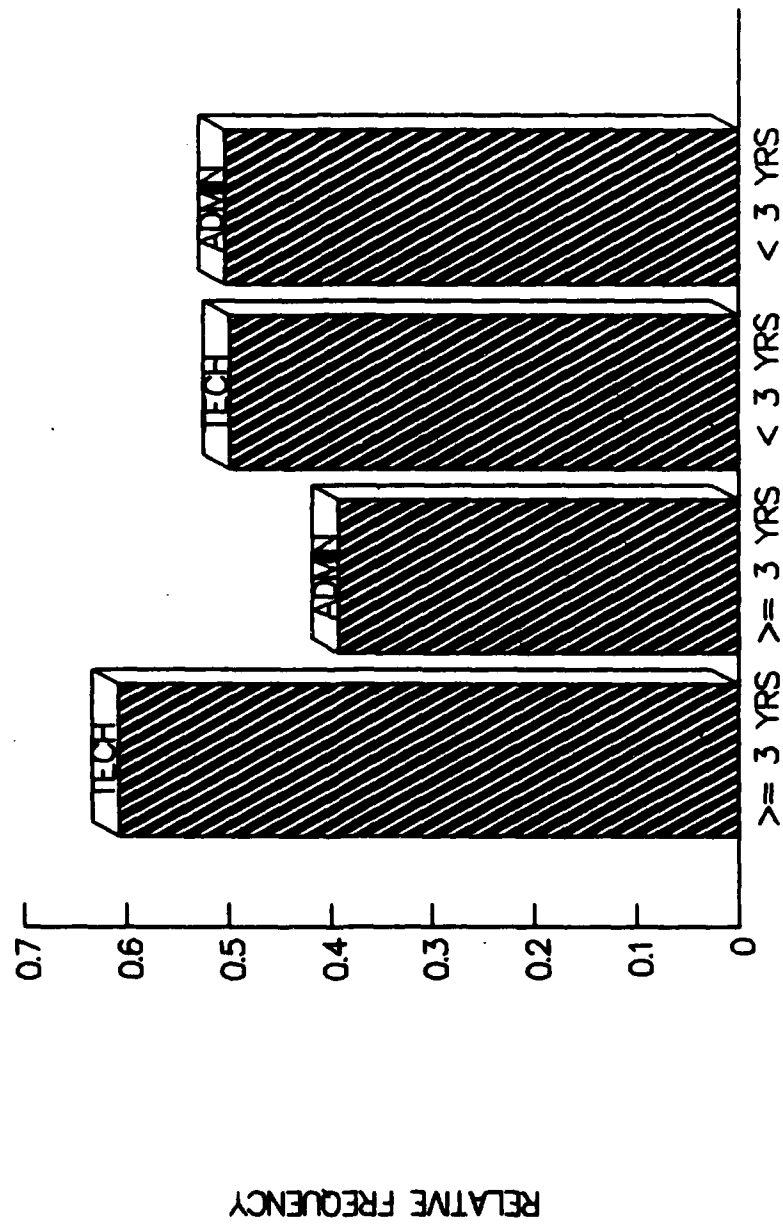


Figure 6. Time in MAC Effect

Calculated Value: 18.25

Therefore: Since the calculated value is greater than the critical value, the null hypothesis is rejected.

The test clearly indicates a significant difference in responses as a function of whether a person has been in MAC three or more years. This difference might have been explained by a lack of Air Force experience in general if most of the respondents with less than three years in MAC also had not been in the Air Force very long. However, of the 20 respondents who had been in MAC less than 3 years, only 5 had been in the Air Force less than 5 years. Therefore, three quarters of the respondents with less than three years in MAC had been in the Air Force five or more years. Fourteen of them had 10 or more years of Air Force experience. Apparently, experience in other commands affects the way maintenance supervisory personnel regard technical and administrative characteristics in entry-level maintenance officers.

Of the original 172 usable surveys returned, 20 were completed by people with less than 3 years in MAC. The difference in the responses between the groups with less than three years and three or more years in MAC was quite large. Since they were not representative of the overall command response, returns from those with less than three years were not considered in any further analyses. This reduced the number of usable surveys to 152.

Comparing Nominal and Interval Data. Section 5 of the survey was designed to yield interval level data to accommodate more powerful parametric testing. In order to generalize Section 5 parametric tests across the samples, it was necessary to demonstrate that Section 5 was representative of the other survey sections. First, a chi square contingency table analysis for k independent samples was accomplished to determine whether all the survey sections independently produced the same results. The test was as follows:

H<sub>0</sub>: There is no difference in the indicated preference for administrative or technical characteristics between the responses from each of the five survey sections.

H<sub>a</sub>: There is a difference between at least one of the sections and the others.

Significance Level: 0.05, with 4 degrees of freedom

Critical Test Value: 9.49

Calculated Value: 288.43

Therefore: Since the calculated value is greater than the critical value, the null hypothesis is rejected.

Obviously, the sections of the survey did not all yield the same results. Further testing was done to determine if Section 5 data were representative of the rest of the survey responses. The chi square test for two independent samples used to compare Section 5 with the rest of the survey was as follows:

H<sub>0</sub>: There is no difference in the indicated preference for administrative or technical characteristics between the responses from Section 5 and the responses from the rest of the survey.

H<sub>a</sub>: There is a difference between Section 5 and the rest of the survey.

Significance Level: 0.05, with 1 degree of freedom

Critical Test Value: 3.84

Calculated Value: 92.25

Therefore: Since the calculated value is greater than the critical value, the null hypothesis is rejected.

Section 5 data were not representative of the rest of the survey so they could not be used for parametric testing. As a result, only nonparametric tests could be used to describe the survey responses. This did not pose a major problem. Although somewhat less powerful than parametric tests, nonparametric tests are often just as efficient (4:359). Further tests indicated that few of the sections generated results that agreed with any of the other sections. Thus the data from all five sections were converted to nominal level and combined to provide a consistent base upon which to perform analyses of the various groups' responses.

MAC Preference. Figure 7 shows the relative frequencies of technical and administrative responses for all groups combined. This indicates a strong overall MAC preference for technical characteristics over administrative. Technical responses were chosen 61 percent of the time while administrative responses were the choice 39 percent of the time. The tendency toward favoring technical attributes is supported statistically in the



# OVERALL RESPONSES

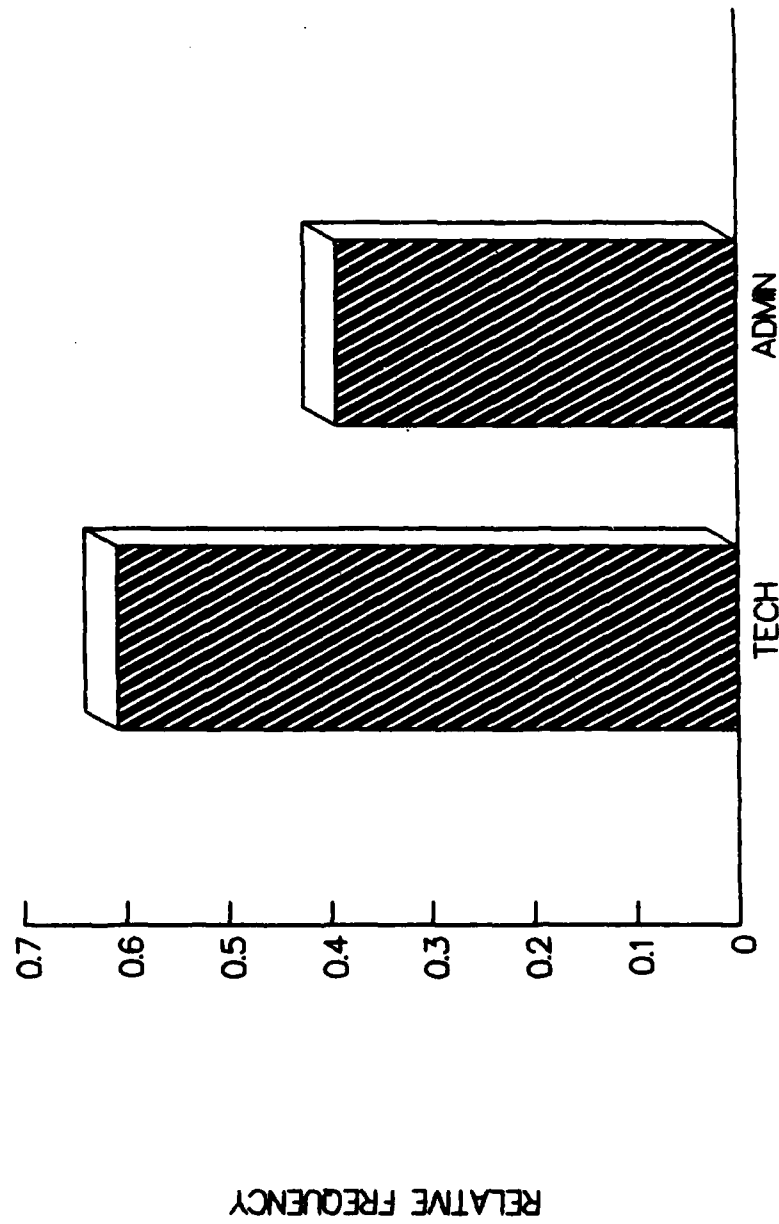


Figure 7. Overall Responses

following one-sample chi square test:

H<sub>0</sub>: There is no definite MAC preference for technical or administrative characteristics.

H<sub>a</sub>: There is a definite MAC preference.

Significance Level: 0.05, with 1 degree of freedom

Critical Test Value: 3.84

Calculated Value: 144.60

Therefore: Since the calculated value is greater than the critical value, the null hypothesis is rejected.

This answered the first investigative question which was, "Do Military Airlift Command aircraft maintenance supervisory personnel prefer entry-level maintenance officers to possess more administrative or technical characteristics?" MAC maintenance supervisory personnel as a whole expressed a preference for entry-level maintenance officers to be more technically than administratively inclined. This finding was in line with Air Force publications emphasizing the importance of technical competence in the aircraft maintenance officer career field (2:A13-15). Although the overall preference was clearly for technical expertise over administrative skill, additional tests were conducted to determine individual group preferences and the extent of any disparities between groups.

Major Groups. The two major groups of interest in this study were entry-level maintenance officers' superiors and subordinates. The following sections include individual

analyses of each group and a comparison of the responses from the two groups.

Superiors. Analyses in this section answered the second investigative question, "Do their superiors prefer entry-level maintenance officers to possess more administrative or technical characteristics?" This group seemed to overwhelmingly favor technical characteristics over administrative. Figure 8 graphically displays the relative frequencies of each type of response. Although the difference in frequencies of the responses appears to be considerable, a one-sample chi square test was performed to ensure the statistical significance of the apparent preference. The test was as follows:

H<sub>0</sub>: Superiors have no definite preference for technical or administrative characteristics.

H<sub>a</sub>: Superiors have a definite preference.

Significance Level: 0.05, with 1 degree of freedom

Critical Test Value: 3.84

Calculated Value: 129.17

Therefore: Since the calculated value is greater than the critical value, the null hypothesis is rejected.

The greater the divergence between the responses, the larger the calculated value becomes (4:362). The large calculated value in this case indicated the superiors group strongly valued technical abilities over administrative.

This discovery conflicted with the author's interpretation of Mount's 1984 study findings which

# SUPERIORS' RESPONSES

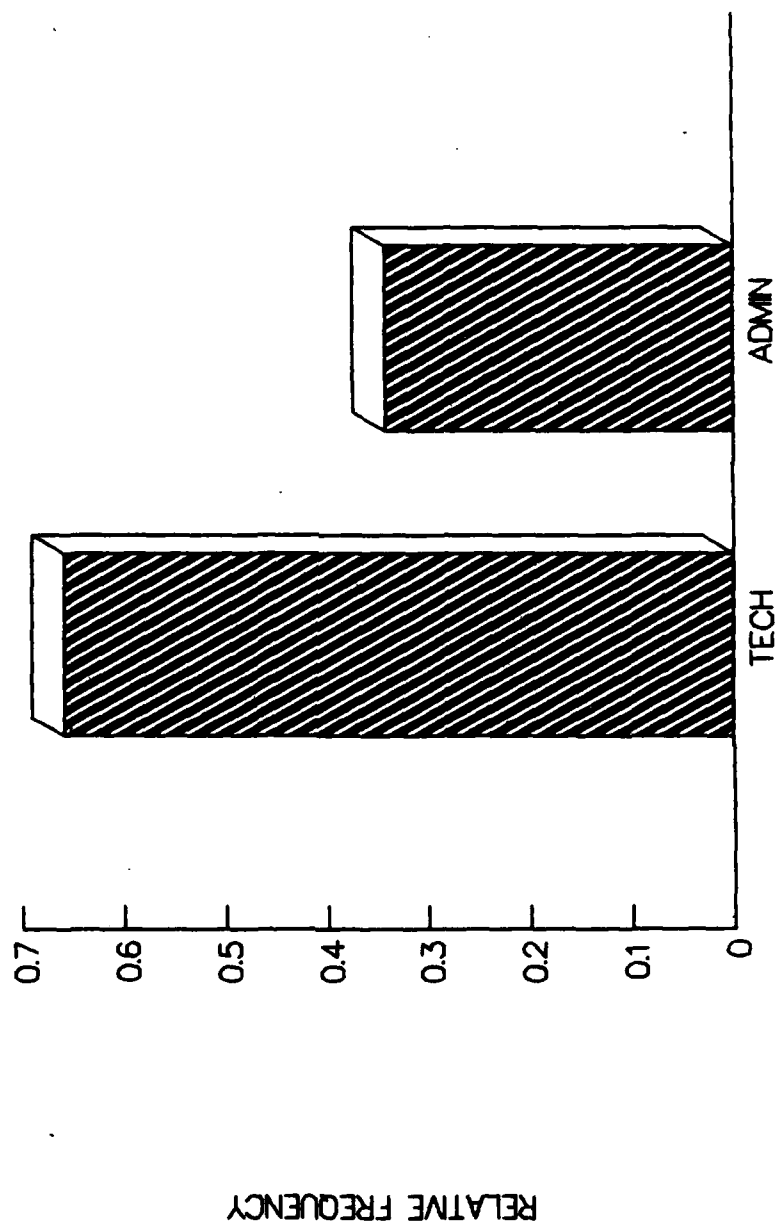


Figure 8. Superiors' Responses

indicated that superiors would be expected to value administrative characteristics more than technical (11:689+). It also was in direct contrast to the personal experiences of many MAC entry-level maintenance officers. A thorough discussion of this disparity appears in a later section of this chapter.

Subordinates. The subordinate group's responses appear graphically in Figure 9. Although the preference did not appear to be quite as strong as that expressed by the superior group, the subordinates also favored technical characteristics. The subordinates' technical responses outnumbered administrative responses 57 percent to 43 percent. Once again, a one-sample chi square test was used to verify the statistical significance of the perceived preference for technical characteristics. The test was performed as follows:

H<sub>0</sub>: Subordinates have no definite preference for technical or administrative characteristics.

H<sub>a</sub>: Subordinates have a definite preference.

Significance Level: 0.05, with 1 degree of freedom

Critical Test Value: 3.84

Calculated Value: 37.45

Therefore: Since the calculated value is greater than the critical value, the null hypothesis is rejected.

The outcome of the chi square test substantiated the graphical results. The subordinate group's preference for technical characteristics matched the author's prediction

# SUBORDINATES' RESPONSES

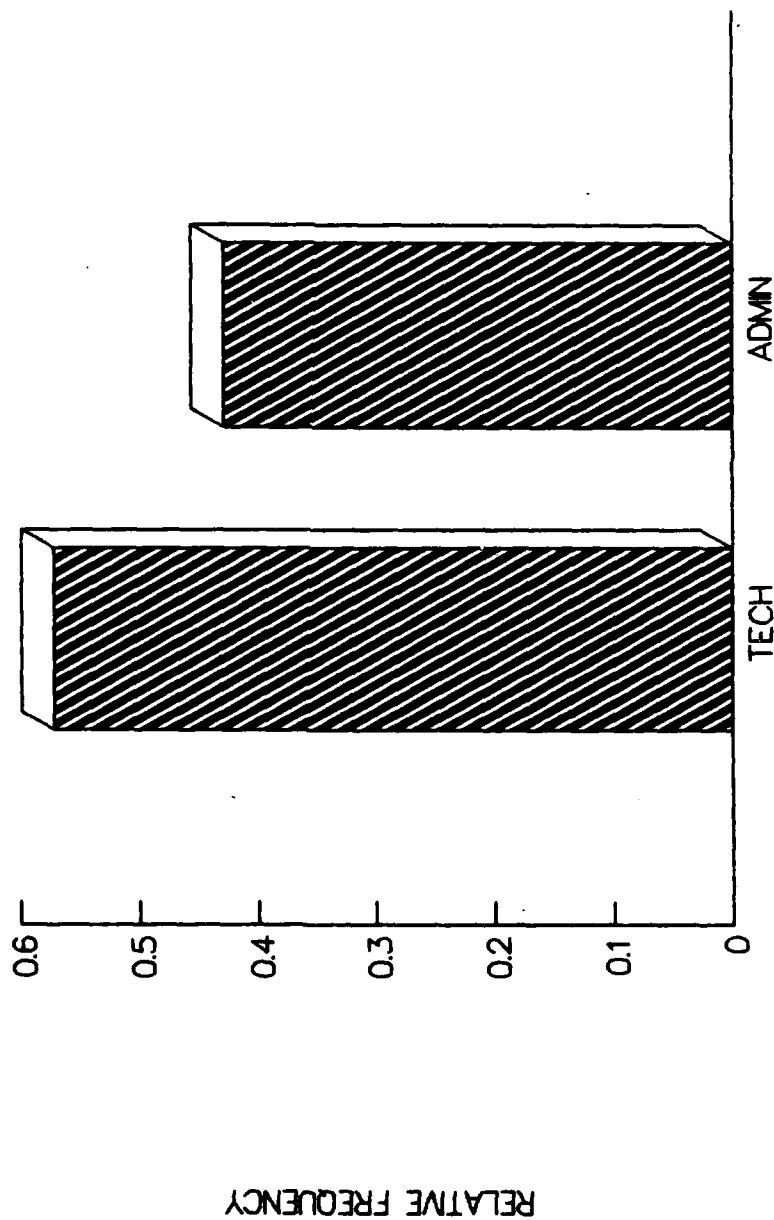


Figure 9. Subordinates' Responses

based on Mount's 1984 study. Seemingly the people whose work is the most technical in nature would want a supervisor who is technically competent as well (11:689+). A maintenance officer with solid technical knowledge is better able to understand his subordinates' job related needs and to make the right decisions when faced with technical problems.

The third investigative question was, "Do their subordinates prefer entry-level maintenance officers to possess more administrative or technical characteristics?" The analyses in this section clearly indicated subordinates preferred technical characteristics. The next section examines the differences in the degree of preference for technical characteristics between the superiors and subordinates groups.

Superiors vs Subordinates. Relative frequencies of responses from the two groups were displayed side by side in Figure 10 so they could easily be compared. The histogram for the subordinate group showed a smaller divergence between responses than did the histogram for the superior group. The same difference in divergence was also evident when the calculated values for chi square were compared. The much greater calculated chi square value for the superiors group showed the divergence between the number of technical and administrative responses was considerably larger than the same divergence for the subordinates group.

# MAJOR SUBGROUP RESPONSES

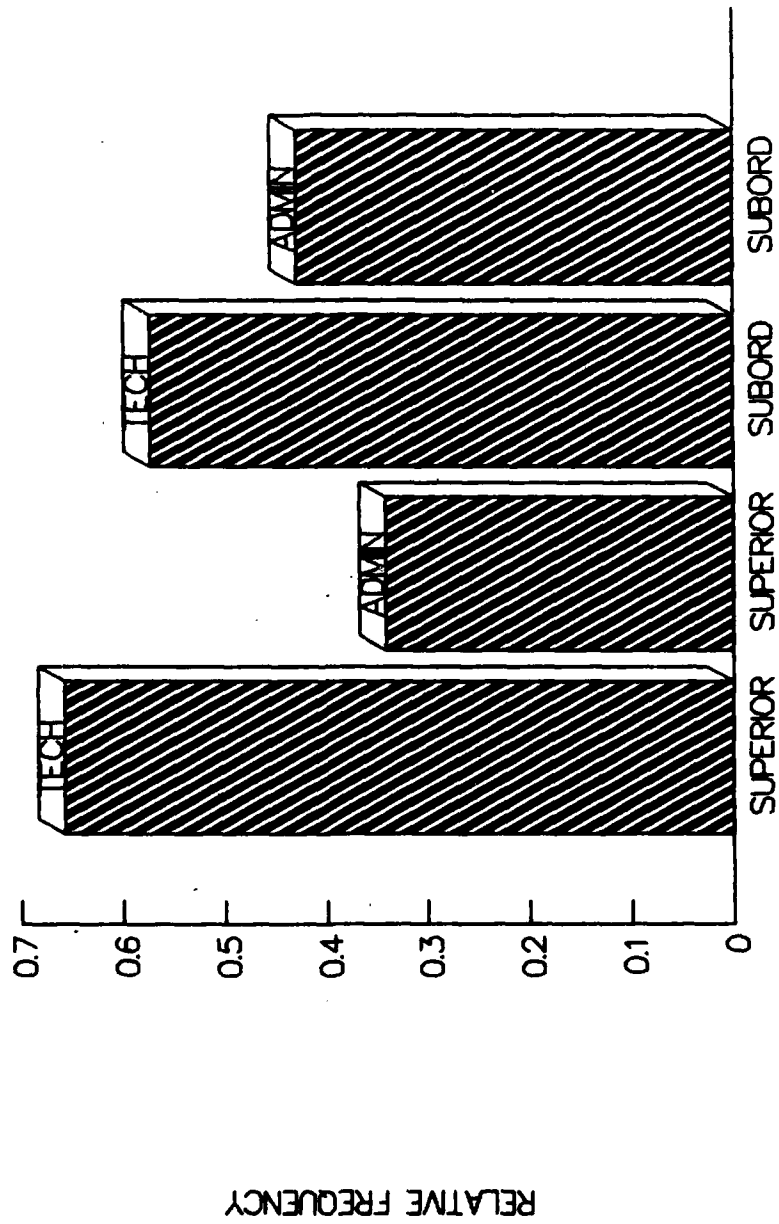


Figure 10. Major Subgroup Responses



This evidence led to the hypothesis that entry-level maintenance officers' superiors had a stronger preference for technical characteristics than did the subordinates. The following two-sample chi square test was used to test the hypothesis:

$H_0$ : There is no difference in preference for technical or administrative ability between superiors and subordinates.

$H_a$ : There is a difference in preference between the two groups.

Significance Level: 0.05, with 1 degree of freedom

Critical Test Value: 3.84

Calculated Value: 23.12

Therefore: Since the calculated value is greater than the critical value, the null hypothesis is rejected.

The inferences drawn from Mount's 1984 study clearly did not hold true for this research. Mount's findings suggested superiors would value administrative skills in entry-level maintenance officers while subordinates would prefer maintenance officers to be more technically proficient. Evidently, subordinates wanted maintenance officers to possess more technical characteristics. The surprise of this study was that superiors also preferred technically oriented maintenance officers. Furthermore, superiors seemed to place more emphasis on the importance of technical competence than did the subordinates.

Although the preferences expressed by the superior and subordinate groups were considerably different than the

author anticipated and the literature indicated, at least one previous study's results were matched. In a 1980 article, Connolly and others established that different constituencies had different views about an entity's effectiveness (1:216). When taken in the context of this research, their findings suggested the different groups would prefer different characteristics in entry-level maintenance officers. If different characteristics were not present, then varying degrees of the same characteristics would be found. This appeared to be true for the two-sample case of superiors and subordinates.

These initial results contrasted with the findings of certain studies presented in the background section of Chapter I. However, other research was still to be replicated. For example, Tsui and Milkovich stated the 'largest differences were between the two constituencies most distant in the organization hierarchy' (15:533-534). Although the author's and others' experience suggested otherwise, the superior group had a stronger preference for technical characteristics than did the subordinate group. Perhaps then, the DCMs would have the strongest preference for technical characteristics and the shop chiefs would have the least preference with the other groups falling between in order of their position in the base-level hierarchy. The following sections describe the responses from each of the six subgroups and offer analyses of the results.

Subgroups. Data from each of the six subgroups were analyzed independently and compared with data from the other sub-groups. The independent analyses are presented first, followed by tests comparing responses from various groups. This section served to answer the fourth investigative question which asked, 'Is there a difference between what certain subgroups of superiors and subordinates prefer? What are the differences?' The preferences of the individual subgroups are explained first, followed by comparisons of the various subgroups to determine the differences between them.

DCMs. The DCM group expressed a strong desire for entry-level maintenance officers to possess technical characteristics. Their responses are summarized graphically in Figure 11. As the graph indicates, technical responses far outnumbered administrative responses. A one-sample chi square test confirmed what the graph suggested.

H<sub>0</sub>: There is no definite DCM preference for technical or administrative characteristics.

H<sub>a</sub>: There is a definite DCM preference.

Significance Level: 0.05, with 1 degree of freedom

Critical Test Value: 3.84

Calculated Value: 39.09

Therefore: Since the calculated value is greater than the critical value, the null hypothesis is rejected.

Squadron Commanders. This group also exhibited a preference for technical characteristics. Figure 12 shows

## DCM RESPONSES

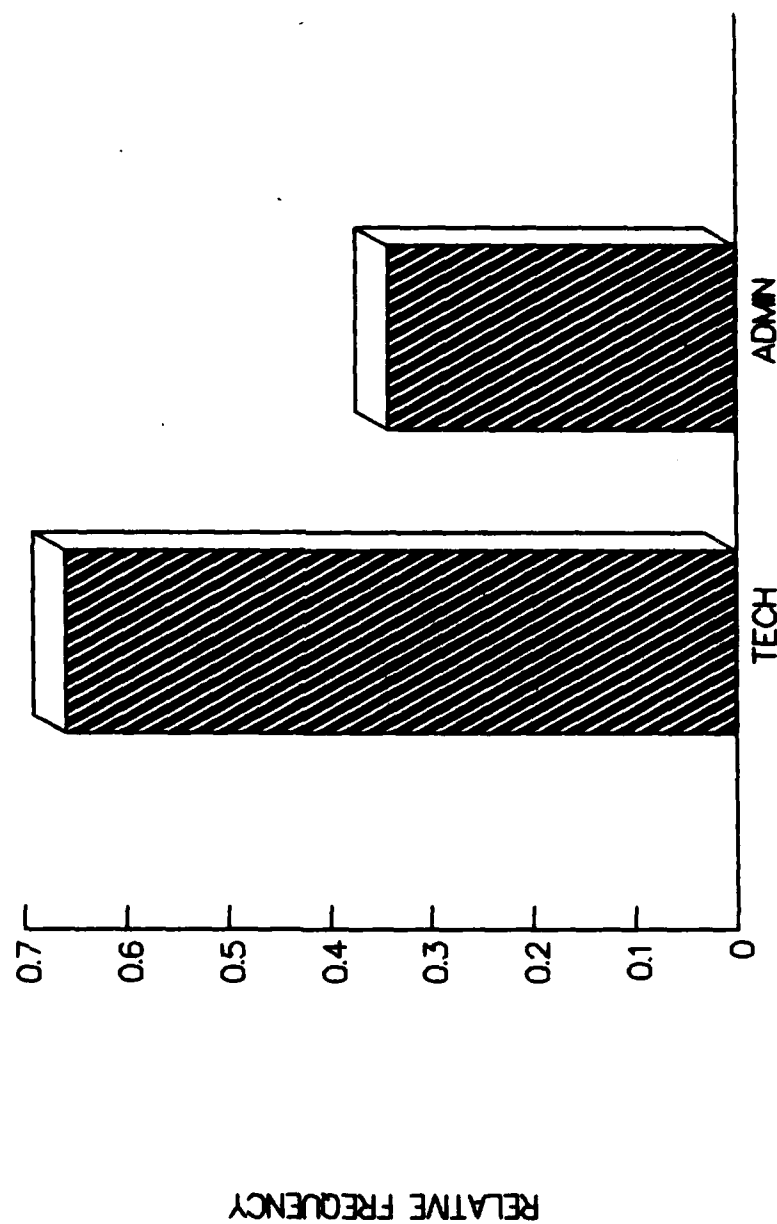


Figure 11. DCM Responses

# SQ CC RESPONSES

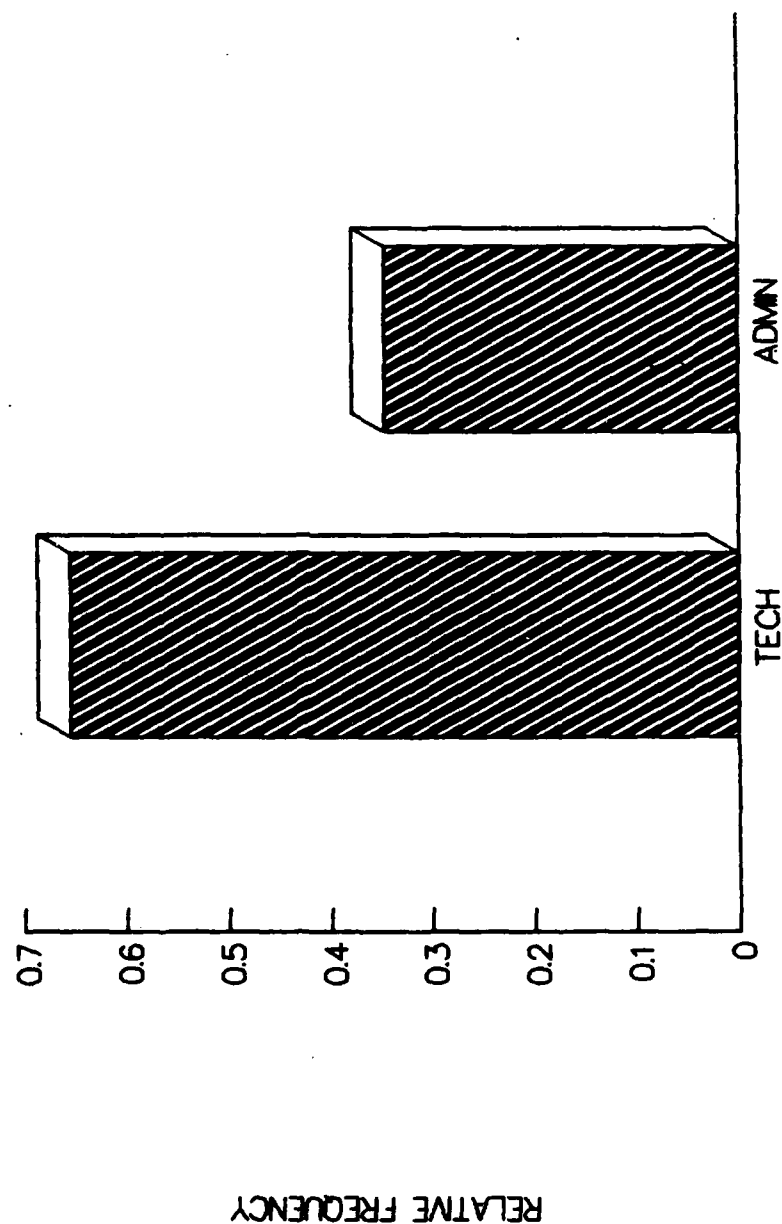


Figure 12. Squadron Cmdr Responses

the wide variance between the numbers of administrative and technical responses. The squadron commander group had the greatest divergence between the actual and hypothesized response frequencies as shown by the high calculated chi square value. The following one-sample chi square test indicates the statistical significance of the group's preference:

H<sub>0</sub>: There is no definite squadron commander preference for technical or administrative characteristics.

H<sub>a</sub>: There is a definite squadron commander preference.

Significance Level: 0.05, with 1 degree of freedom

Critical Test Value: 3.84

Calculated Value: 51.88

Therefore: Since the calculated value is greater than the critical value, the null hypothesis is rejected.

Maintenance Supervisors. Like the other superior subgroups, maintenance supervisors preferred technical characteristics over administrative for entry-level maintenance officers. The following one-sample chi square test lends statistical significance to the graphical representation of the responses displayed in Figure 13:

H<sub>0</sub>: There is no definite maintenance supervisor preference for technical or administrative characteristics.

H<sub>a</sub>: There is a definite maintenance supervisor preference.

Significance Level: 0.05, with 1 degree of freedom

Critical Test Value: 3.84

Calculated Value: 38.25

# MX SUPERVISOR RESPONSES

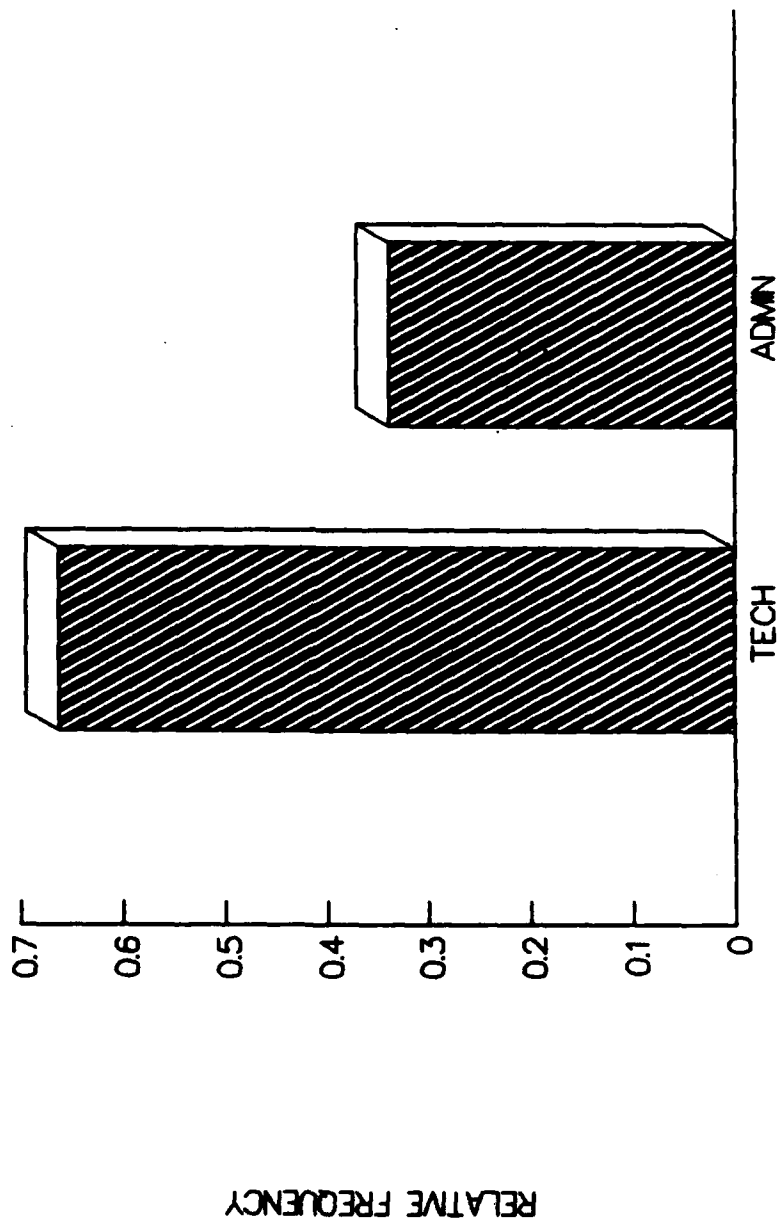


Figure 13. Mx Supervisor Responses

Therefore: Since the calculated value is greater than the critical value, the null hypothesis is rejected.

Maintenance Superintendents. The only group not having a preference for technical characteristics was the maintenance superintendents. Although Figure 14 shows slightly more technical responses than administrative, the chi square test demonstrates there is no statistical significance to the minor difference in responses.

H<sub>0</sub>: There is no definite maintenance superintendent preference for technical or administrative characteristics.

H<sub>a</sub>: There is a definite maintenance superintendent preference.

Significance Level: 0.05, with 1 degree of freedom

Critical Test Value: 3.84

Calculated Value: 2.86

Therefore: Since the calculated value is less than the critical value, the null hypothesis can not be rejected.

Curiously, this was the only group that did not prefer technical characteristics. The unusual position maintenance superintendents occupy in the organizational hierarchy may contribute to their feelings about the characteristics maintenance officers should possess. Although maintenance superintendents are subordinate in rank to entry-level maintenance officers, their position is superior to the branch level position typically occupied by entry-level MOs. Maintenance superintendents are NCOs who have worked their way up through the ranks to attain the highest enlisted position in base-level maintenance. On the way up, they



# MX SUPERINTENDENT RESPONSES

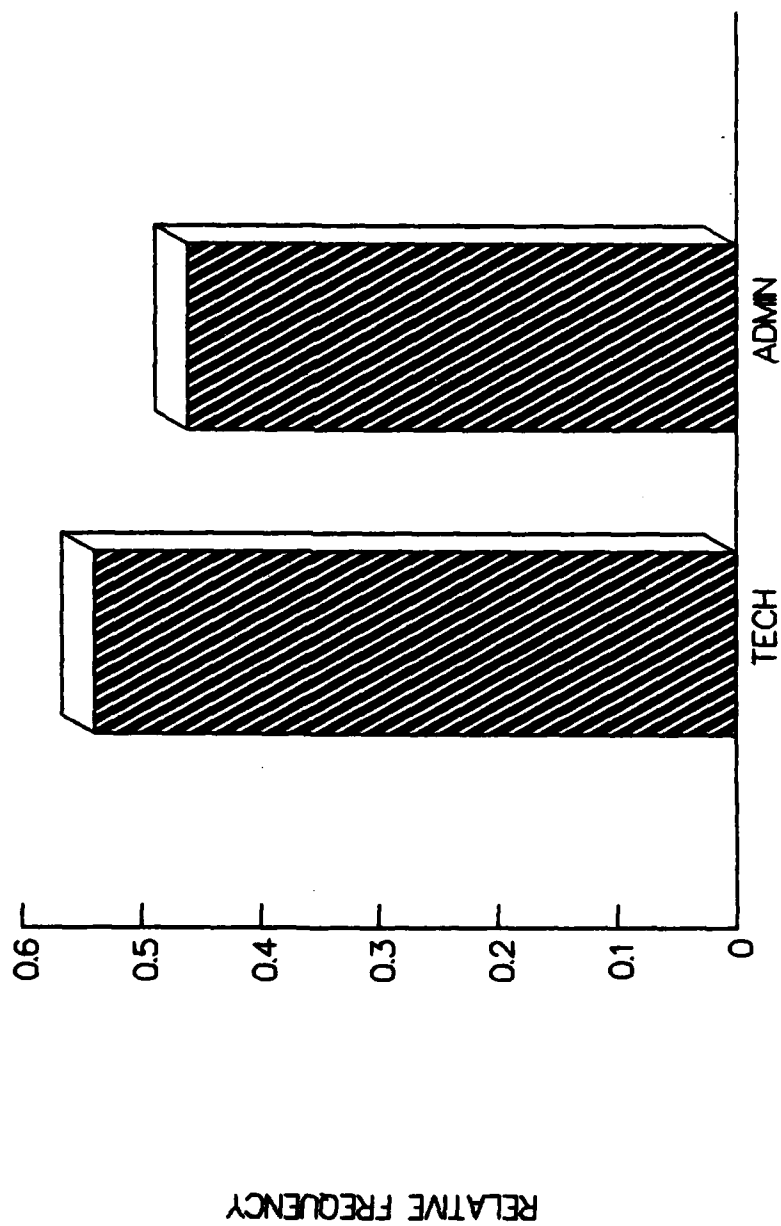


Figure 14. Mx Superintendent Responses

usually become the most proficient technicians in their career fields. Once they become maintenance superintendents, they assume considerably more administrative duties than they ever had before. They normally continue to think of themselves as technical experts rather than administrators and often assume they should handle technical problems while the maintenance supervisor takes care of administrative details. Therefore, it is natural for them to not desire strong technical characteristics in entry-level maintenance officers.

Branch Chiefs. This group indicated a strong preference for technical characteristics. Figure 15 shows that technical choices were 61 percent of the responses, while only 39 percent were administrative. The following one-sample chi square test substantiated the strength of the technical preference.

$H_0$ : There is no definite branch chief preference for technical or administrative characteristics.

$H_a$ : There is a definite branch chief preference.

Significance Level: 0.05, with 1 degree of freedom

Critical Test Value: 3.84

Calculated Value: 30.32

Therefore: Since the calculated value is greater than the critical value, the null hypothesis is rejected.

Shop Chiefs. Figure 16 shows the shop chiefs preference for technical characteristics over administrative. This group's preference for technical

# BRANCH CHIEF RESPONSES

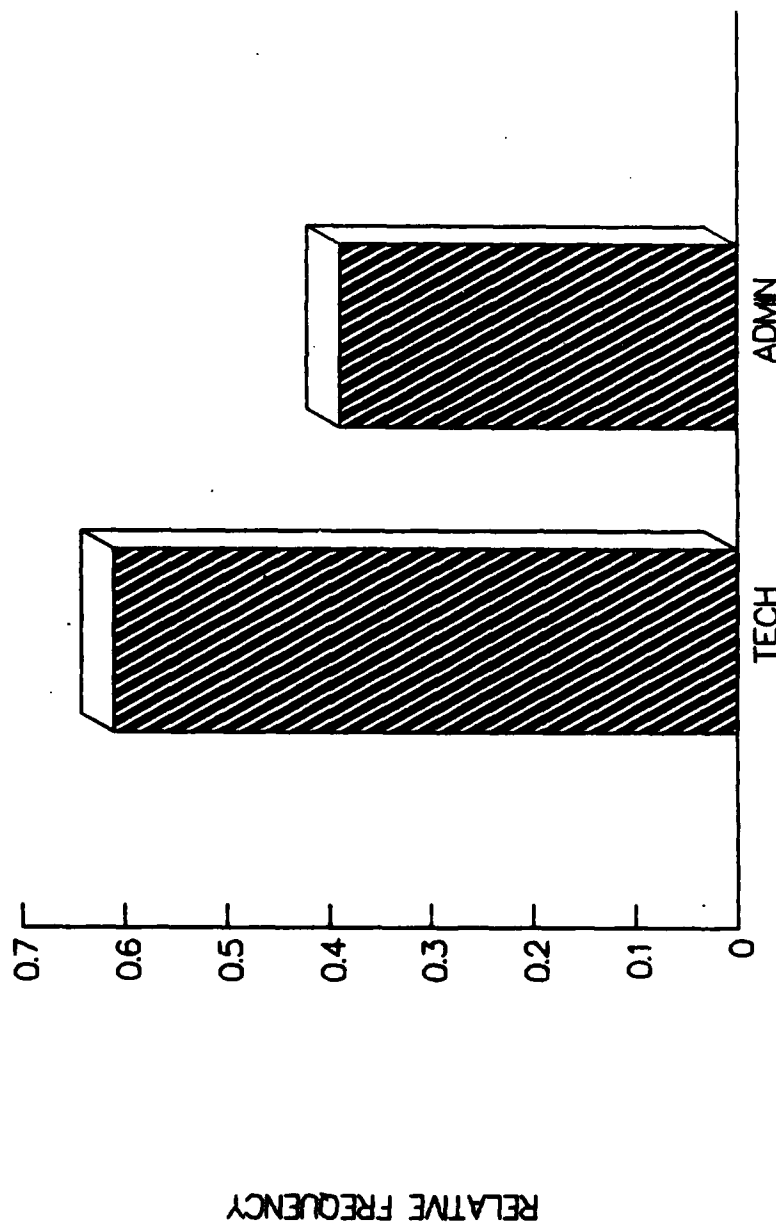


Figure 15. Branch Chief Responses

# SHOP CHIEF RESPONSES

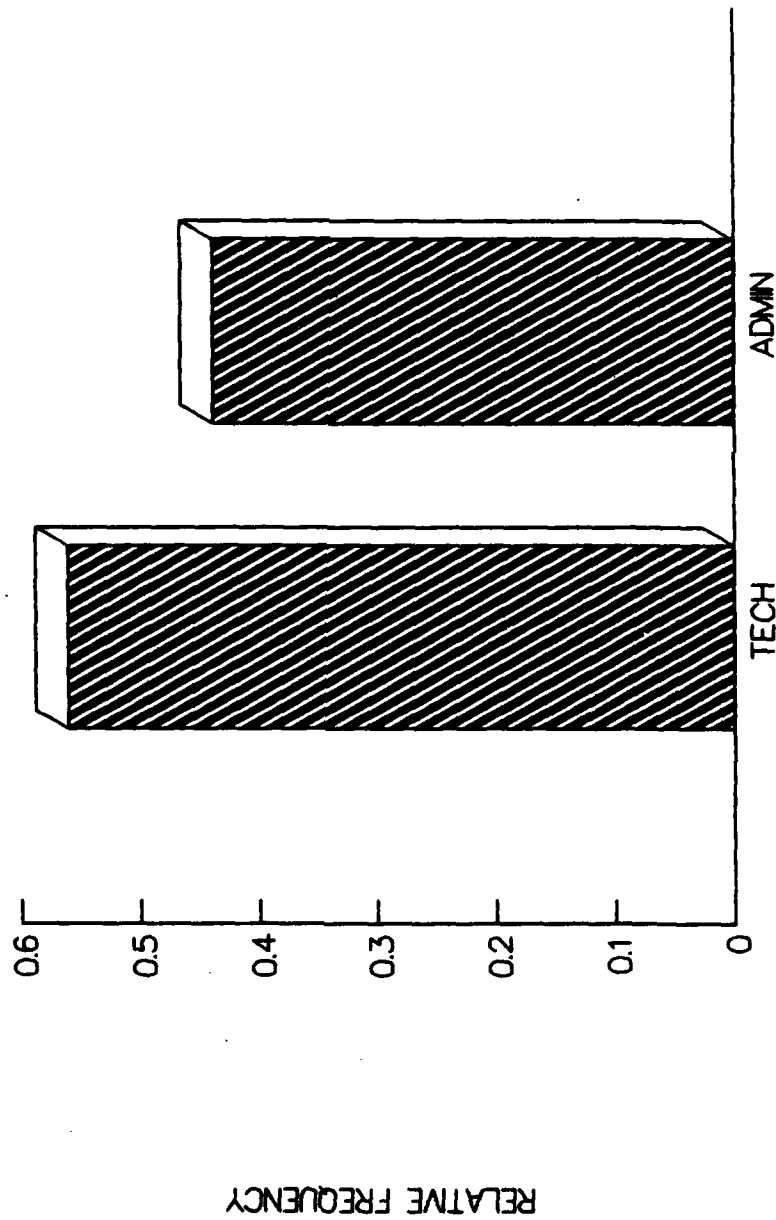


Figure 16. Shop Chief Responses

skills was not as strong as that exhibited by the branch chiefs group. However, as the one-sample chi square test indicates, it was statistically significant as opposed to the neutral position of the maintenance superintendents.

H<sub>0</sub>: There is no definite shop chief preference for technical or administrative characteristics.

H<sub>a</sub>: There is a definite shop chief preference.

Significance Level: 0.05, with 1 degree of freedom

Critical Test Value: 3.84

Calculated Value: 10.43

Therefore: Since the calculated value is greater than the critical value, the null hypothesis is rejected.

#### DCMs, Squadron Commanders, Maintenance

Supervisors. As a group, the superiors strongly favored technical characteristics over administrative for entry-level maintenance officers. Individually, each subgroup preferred a more technical orientation as well. Although the degree of each subgroup's preference varied as Figure 17 illustrates, the variance was slight. The following chi square test for k independent variables indicates the differences were statistically negligible.

H<sub>0</sub>: There is no difference in preference for technical or administrative ability between the three superiors subgroups.

H<sub>a</sub>: There is a difference in preference between the groups.

Significance Level: 0.05, with 2 degrees of freedom

Critical Test Value: 5.99

Calculated Value: 0.06

# SUPERIOR SUBGROUP RESPONSES

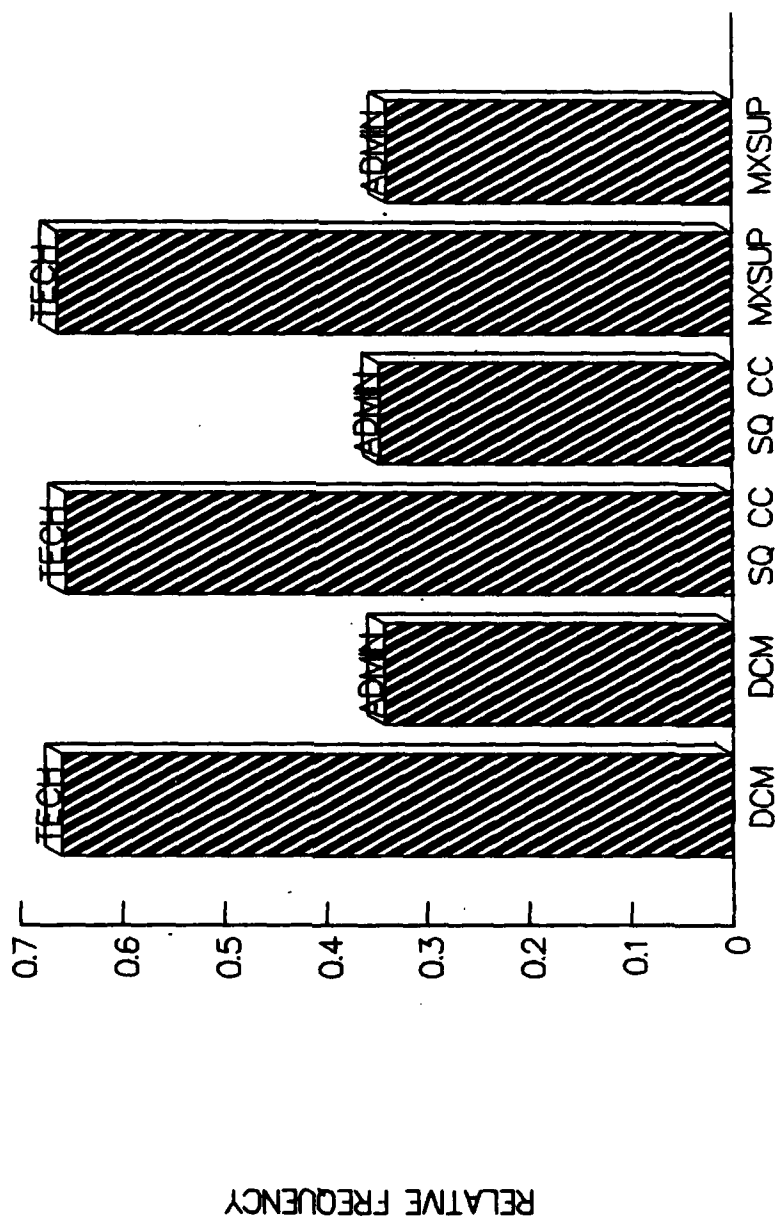


Figure 17. Superior Subgroup Responses

Therefore: Since the calculated value is less than the critical value, the null hypothesis can not be rejected.

The extremely small calculated chi square value indicates very little divergence existed between these three subgroups' preferences. Therefore, it was not necessary to perform any cross comparisons to determine individual differences. Two-sample chi square tests were calculated to identify differences between each of the superior subgroups and each of the subordinate subgroups. In nearly every case, the superior subgroup had a stronger preference (at a 0.05 significance level) for technical characteristics than the subordinate subgroup did. The exception was the branch chief subgroup. The specifics are presented in the next section on subordinate subgroups.

According to these results, DCMs, squadron commanders, and maintenance supervisors desired entry-level maintenance officers to be considerably more technically than administratively oriented. This was exactly opposite of the results the author expected to find. Instead of helping to find a solution to the dilemma entry-level maintenance officers face, this information just makes the problem more confusing. The problem as identified early in this thesis was that entry-level maintenance officers are faced with pressures from their subordinates to be technically competent while their superiors demand them to be more administratively oriented. Although this study apparently

eliminates the theory that superiors emphasize administrative characteristics, there is evidence that the responses submitted by the superiors group do not correspond to the message this group seems to be sending to new maintenance officers in the field. This is discussed in more detail near the end of this chapter and in Chapter IV.

Maintenance Superintendents, Branch Chiefs, Shop Chiefs. This was the most interesting group in terms of varying degrees of expressed preference. It is apparent in Figure 18 that these three subgroups do not all agree the way the superiors subgroups did. The chi square test for k independent samples proves the disparity between the groups is statistically significant.

H<sub>0</sub>: There is no difference in preference for technical or administrative ability between the three subordinates sub-groups.

H<sub>a</sub>: There is a difference in preference between the groups.

Significance Level: 0.05, with 2 degrees of freedom

Critical Test Value: 5.99

Calculated Value: 6.28

Therefore: Since the calculated value is greater than the critical value, the null hypothesis is rejected.

Since there was a divergence between the subgroups' responses, it was necessary to test each of the subgroups against the other two. Additionally, the subgroups were individually compared with the superior group and subgroups. The comparisons highlighted several unusual relationships.



# SUBORDINATE SUBGROUP RESPONSES

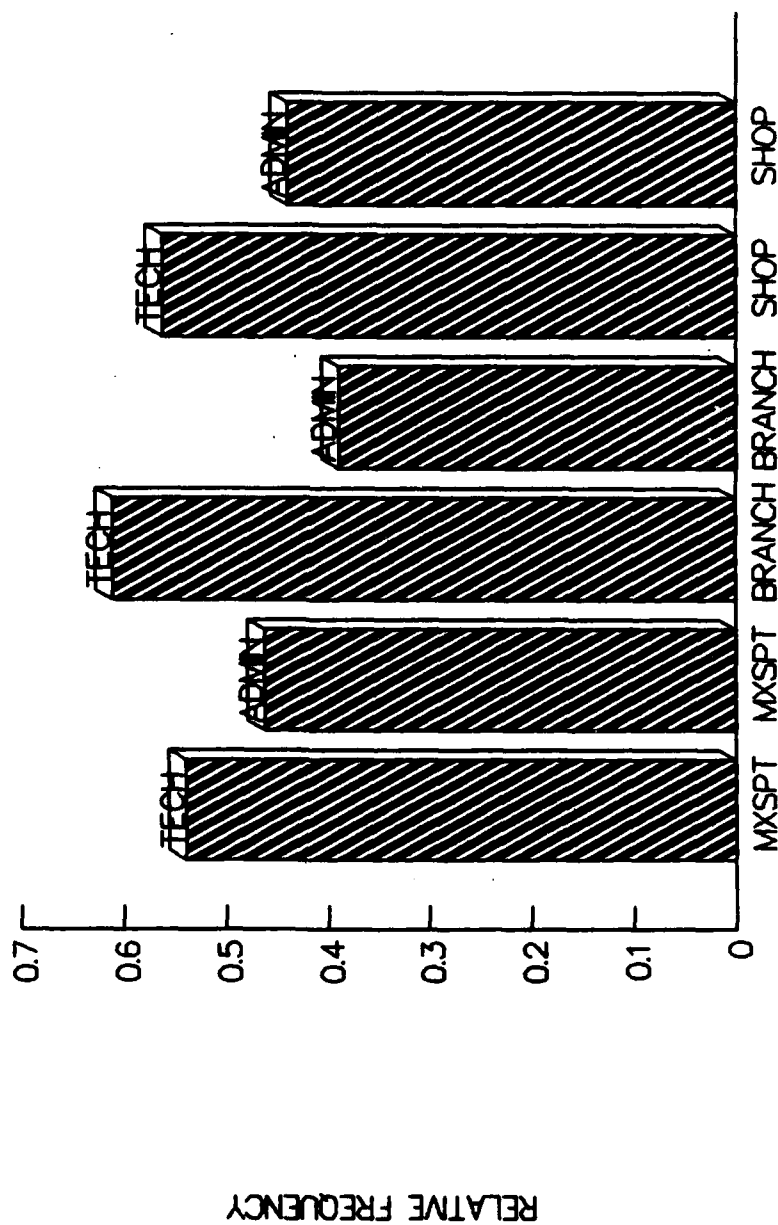


Figure 18. Subord Subgroup Responses

The shop chiefs group followed the pattern established by the superior subgroups. There was agreement with each of the other subgroups within the subordinate major group and divergence from the subgroups outside its own major group. Interestingly, this group did not differ statistically from the combined branch chief/maintenance superintendent group. The shop chief group's divergence in its preference for technical versus administrative characteristics fell between the calculated divergences of the other two groups. Therefore, it should have been expected that the combination of the other two groups' responses would yield an output resembling that of the shop chiefs. None of the calculated values were close to the critical chi square values at a 0.05 significance level. The complete tests are available in Appendix C.

Shop chiefs desired entry-level maintenance officers who were more technically inclined. This preference is understandable considering the nature of the shop chiefs' work. This group is primarily made up of technicians. Therefore, it seems only natural for them to want their superiors to be able to understand their work. However, the strength of their preference was less than that expressed by branch chiefs.

The branch chiefs group differed radically from the standard pattern. When compared with each of the other subgroups individually, branch chiefs were not statistically

different from shop chiefs or any of the superiors subgroups. This group also matched the combined superiors group. One on one, they differed only with the maintenance superintendents. Another statistically significant divergence appeared between the branch chiefs and the combined group of shop chiefs and maintenance superintendents. Since the branch and shop chief groups agreed with one another, the maintenance superintendent group obviously differed enough from the other two to force the divergence. The hypothesis tests for this section are available in Appendix C.

Of the subordinates subgroups, branch chiefs clearly leaned the most toward favoring technical characteristics in entry-level maintenance officers. This may be true because of their proximity to branch OICs in the organizational hierarchy. Branch chiefs and OICs practically share the same job. Although there is a considerable amount of administrative work, the job at this level still depends heavily on technical expertise. Branch chiefs apparently wanted a partner who understands the nature of the job as it applies to the technicians.

Maintenance superintendents differed significantly from most of the other sample groups. They agreed individually only with the shop chiefs. Their responses were statistically the same as the combined shop chief/branch chief group as well. Their 'non-preference' contrasted with

all the other subgroups and combinations of subgroups tested. Appendix C contains the chi square tests used to compare maintenance superintendents with the other groups. The earlier section on individual subgroup preferences includes a possible explanation for this group's survey responses.

Rank Order and Correlation of Subgroups. The superiors subgroups were impossible to rank order since there was no statistical difference between any of them. However, as a group and individually they overwhelmingly chose technical characteristic responses more than any other subgroup. Therefore, the superiors subgroups should all be ranked together as the groups most desiring technical characteristics. The group with the next strongest preference for technical abilities was the branch chief subgroup. This group's feelings were more closely aligned with the superiors subgroups than with any others. The shop chief subgroup favored technical characteristics as well, but to a lesser degree than the branch chiefs so they fell in the next position in the order. Finally, the maintenance superintendents subgroup occupied the position at the other end of the continuum. This group's apparent lack of preference for either technical or administrative characteristics was unlike the desires of any of the other groups. Although the groups' rank order was not in an organizational hierarchy sequence, a test for correlation

was performed to determine if there was any relationship between position and strength of preference for technical characteristics.

Correlation was tested using Cramer's statistic. The calculated value of 0.098 indicated there was practically no correlation between organization hierarchy level and degree of preference for a particular entry-level maintenance officer characteristic. Tsui and Milkovich's results were not replicated in this case (15:534). They found viewpoints differed from group to group with the greatest differences between the groups farthest apart in the organization hierarchy. In this case, viewpoints did not always differ from group to group. Additionally, the greatest difference was between two groups adjacent to one another in the organizational hierarchy. If maintenance superintendents had been left out of the study because of their unique organizational relationship to entry-level maintenance officers, then the two groups most distant in the hierarchy would have had the greatest difference in viewpoints. Figure 19 displays the relative frequencies of responses for each of the six subgroups.

Lieutenant Branch Chiefs. Nine lieutenants answered the survey as branch chiefs. Since branch chief is an NCO position according to AFR 66-1 and this research was aimed at NCOs in that position, those nine surveys were not analyzed with the rest of the returns. However, the

# SUBGROUP RESPONSES

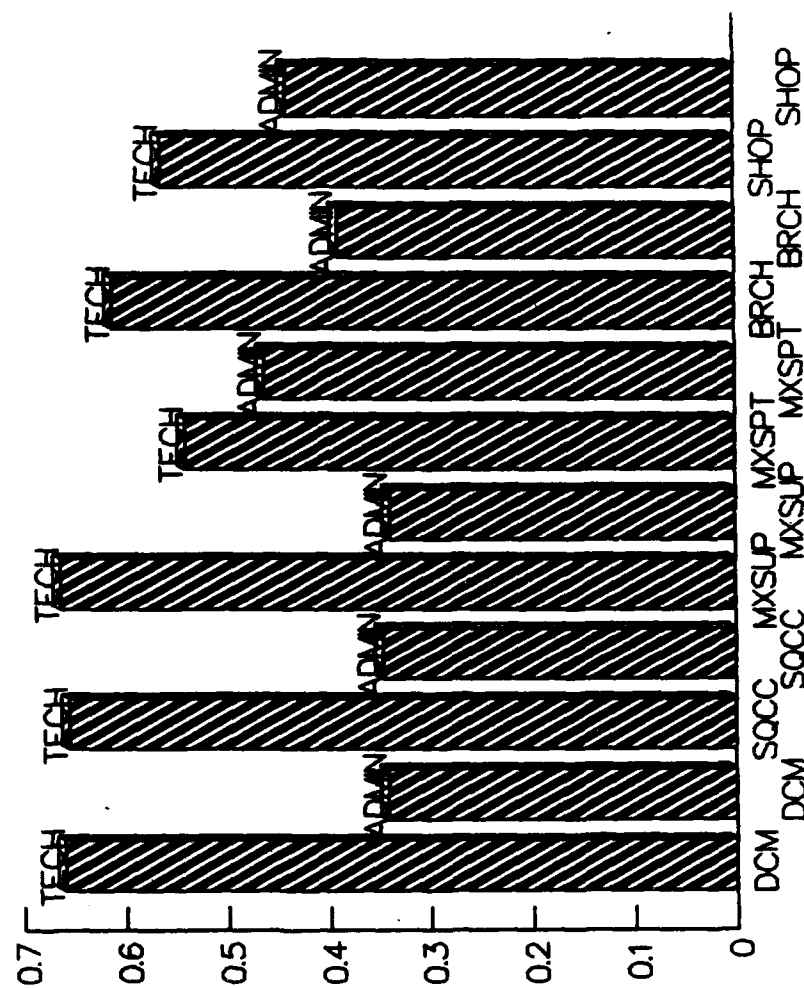


Figure 19. All Six Subgroup Responses

RELATIVE FREQUENCY

responses from the lieutenants provided some interesting insights into the general problem identified in Chapter I.

The author claimed entry-level maintenance officers' superiors wanted the MOs to possess more administrative characteristics, while subordinates preferred maintenance officers more technically oriented. This was the basis of the frustration many new maintenance officers faced in MAC. However, as this research indicated, the only conflict appeared to be variations in the strength of preferences for technical characteristics among the groups. If each constituency truly desired entry-level maintenance officers to be more technically than administratively proficient, then there must be some question whether a problem actually exists. The lieutenant branch chiefs' responses indicate otherwise. This group was sampled inadvertently, so there was no control over the randomness of selection. No claims to any statistical significance are intended, and the group's responses are presented only as an item of interest.

The lieutenants' responses differed from most of the other groups. They indicated no preference for either technical or administrative characteristics. This was odd considering the data indicated both superiors and subordinates preferred technical characteristics over administrative. If this was truly the case, then the lieutenant branch chiefs (entry-level maintenance officers themselves) should indicate a preference similar to that

expressed by their superiors and subordinates. Tsui showed that middle level managers develop characteristics to satisfy the demands placed on them by their superiors and subordinates. She also found that superiors and subordinates placed different demands upon middle managers (14:90). When compared with the analyses presented above, the unscientifically acquired responses from the lieutenants contradicted Tsui's research. A possible reason for the group answering the questionnaire this way would be if the subordinate and superior groups had imposed different demands upon the entry-level maintenance officers. For the entry-level MOs to express no preference, either the superiors or subordinates must have communicated to them a preference for one characteristic while the other group expressed preference for the other characteristic. This explanation would follow in line with the literature of the behavioral scientists. Apparently, one of the major groups answered the survey one way but actually communicated the opposite desires to entry-level maintenance officers. The author stands by the original contention that, in the field, superiors generally emphasize administrative functions while subordinates typically prefer technical characteristics in entry-level maintenance officers. If superiors genuinely prefer technical characteristics, as their survey responses indicate, then they are not conveying this preference to their young maintenance officers.



## Summary

This chapter identified some problems with the survey instrument and explained the resulting limitations. It covered factors affecting the survey return rate and described how data were converted to nominal level to establish a common base for analyses. Finally, the results of the survey and analyses of those results were presented.

The problems with the survey centered around the fact that each section returned information that did not match the other sections. Therefore, the survey apparently did not provide the same measurement of preference from section to section. Responses from the straight forward questions in Section 8 clearly substantiated this belief. Section 8 indicated that each sampled group preferred entry-level maintenance officers who were slightly more technically than administratively oriented. There was no statistical difference between the responses of each of the groups. Although the other sections generated some questionable results in terms of absolute preferences, they were useful for highlighting specific differences between the groups.

The survey return rate was very high. Eighty-one percent of the 224 surveys that were mailed on 25 February 1988 were returned by 1 May 1988 which was the survey expiration date. Nine surveys were not used because they were filled out by the wrong people. Another 20 were later discarded when it was shown that respondents with less than

3 years in MAC answered much differently than did those who had more MAC experience.

Many comparisons were made of the various respondent groups. Since most of the data were nominal level, relative frequency histograms and chi square contingency tables were used extensively to analyze and compare the groups' responses. As a result of the analyses, the four investigative questions posed in Chapter I were answered. The actual statistical tests used to answer the investigative questions are shown throughout this chapter and in Appendices B and C. Concluding comments and recommendations for future research efforts appear in the next chapter.

#### IV. Conclusions and Recommendations

##### Introduction

This chapter provides a summary of the findings, the author's comments, and some recommendations for further studies. The conclusion section first presents a review of the answers to the investigative questions from two different perspectives. The second part is a discussion of the survey Section 8 questions pertaining to respondents' perceptions of the best and worst maintenance officers with whom they have worked. Next, a comparison of the results of this research with the findings of previous studies by recognized experts in the social sciences is presented. Finally, a recap of the survey limitations is followed by the author's comments about the study. Recommendations to improve the plight of the entry-level maintenance officer and suggestions for future research conclude the thesis.

##### Conclusions

Answers to Investigative Questions. Answers to the investigative questions were derived from the statistical analyses presented in the previous chapter. The questions and their answers are summarized as follows:

Q1. Do MAC aircraft maintenance supervisory personnel prefer entry-level maintenance officers to possess more administrative or technical characteristics?

A1. The overall MAC preference was for technical characteristics.

Q2. Do their superiors prefer entry-level maintenance officers to possess more administrative or technical characteristics?

A2. Superiors strongly preferred technical characteristics.

Q3. Do their subordinates prefer entry-level maintenance officers to possess more administrative or technical characteristics?

A3. Subordinates preferred technical characteristics.

Q4. Is there a difference in preference between certain subgroups of superiors and subordinates? What are the differences?

A4. DCMs, squadron commanders, and maintenance supervisors strongly preferred technical characteristics. There was virtually no difference between the strengths of their preferences. Maintenance superintendents did not prefer either characteristic over the other. Branch chiefs expressed a strong preference for technical characteristics. Shop chiefs preferred technical characteristics, but their preference was not as strong as that voiced by branch chiefs or superiors.

These answers are based on the analyses of Sections 2 through 5 and Section 7 of the survey. Question 65 in Section 8 asked for respondents' image of the ideal maintenance officer. The responses to this question returned answers of 'slightly more technical' to the first three investigative questions. In answer to the final investigative question, survey Question 65 results found no statistically significant differences between the preferences of any of the subgroups. As previously demonstrated, survey Sections 2, 3, 4, 5, and 7 yielded conflicting results. However, Section 8 responses conveyed respondents' preferences with no question as to the implied technical or administrative nature of the question.

Therefore, although the primary analyses presented in Chapter 3 were based on five separate survey sections, the data returned by the Section 8 questions are probably more significant.

Survey Section 8 Questions. As stated above, Section 8 questions asked respondents to describe the best maintenance officer and the worst maintenance officer with whom they had worked. This was done by choosing the position on a five-point Likert scale that best described the extent of technical or administrative characteristics the officer possessed. Respondents were also asked to identify in a like manner the characteristics an ideal maintenance officer should possess. Descriptions of the responses were confined to mean values of a particular group's responses. The distributions of the responses for the three questions varied depending upon the nature of the question. Responses to Questions 62 and 65, which asked for the characteristics of the best maintenance officer the respondents had known and their perception of an ideal maintenance officer, were very similar. It is natural to expect one's notion of an ideal maintenance officer to resemble the characteristics of the best maintenance officer the person had known. The responses to these two questions were approximately normally distributed with a mean value that indicated a slight preference for technical characteristics. Very few respondents favored either of the two extremes as most

responses were concentrated near the center of the scale indicating equal desire for both characteristics. As might be expected, responses to Question 65 were distributed just the opposite.

Question 65 asked for the characteristics of the worst maintenance officer with whom the respondents had worked. There were almost no responses in the middle of the scale. Most were grouped at either end with the majority being described as 'highly administratively oriented.' Clearly, respondents did not prefer entry-level maintenance officers to be highly oriented to either characteristic at the expense of the other. While they did not favor either extreme, respondents answered that the worst maintenance officer was more often highly administratively oriented than highly technically oriented. Therefore, respondents either disliked a strong administrative orientation more than a strong technical orientation or the worst maintenance officers tend to possess strong administrative characteristics. Figures 19, 20, and 21 show the distributions of the responses to the Section 8 questions. A comparison of the survey results with the literature follows in the next section.

Comparison of Survey Results with the Literature. Like many of the other analyses, this comparison had to consider the responses from two different perspectives. The survey Section 8 responses and the other sections' responses were

# BEST MAINTENANCE OFFICER RESPONSES

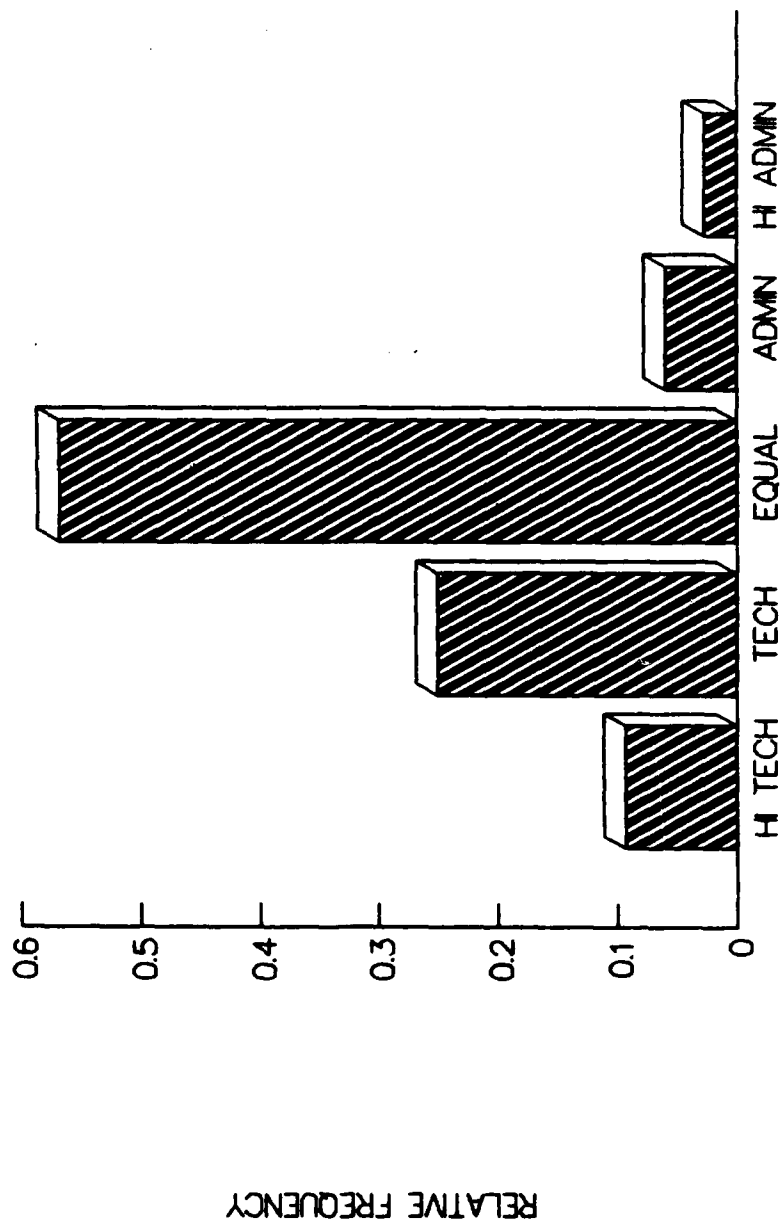


Figure 20. Best Maintenance Officer

# IDEAL MAINTENANCE OFFICER RESPONSES

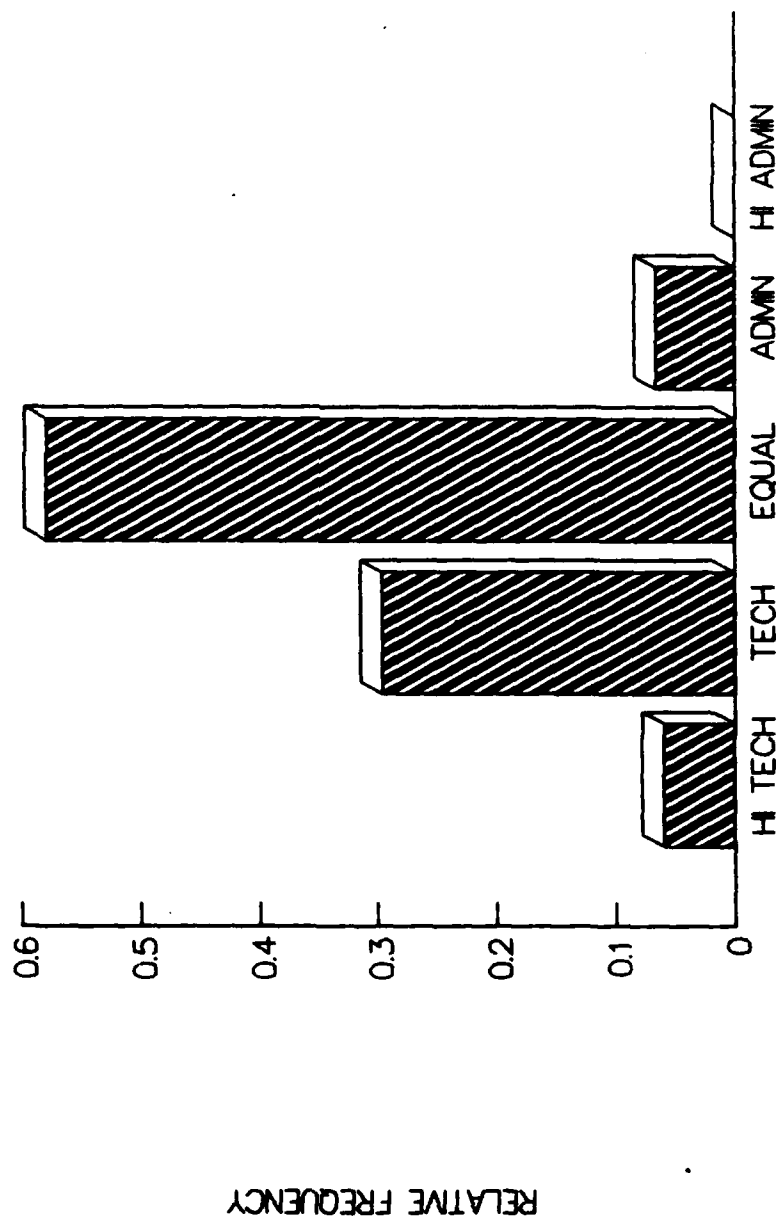


Figure 21. Ideal Maintenance Officer



# WORST MAINTENANCE OFFICER RESPONSES

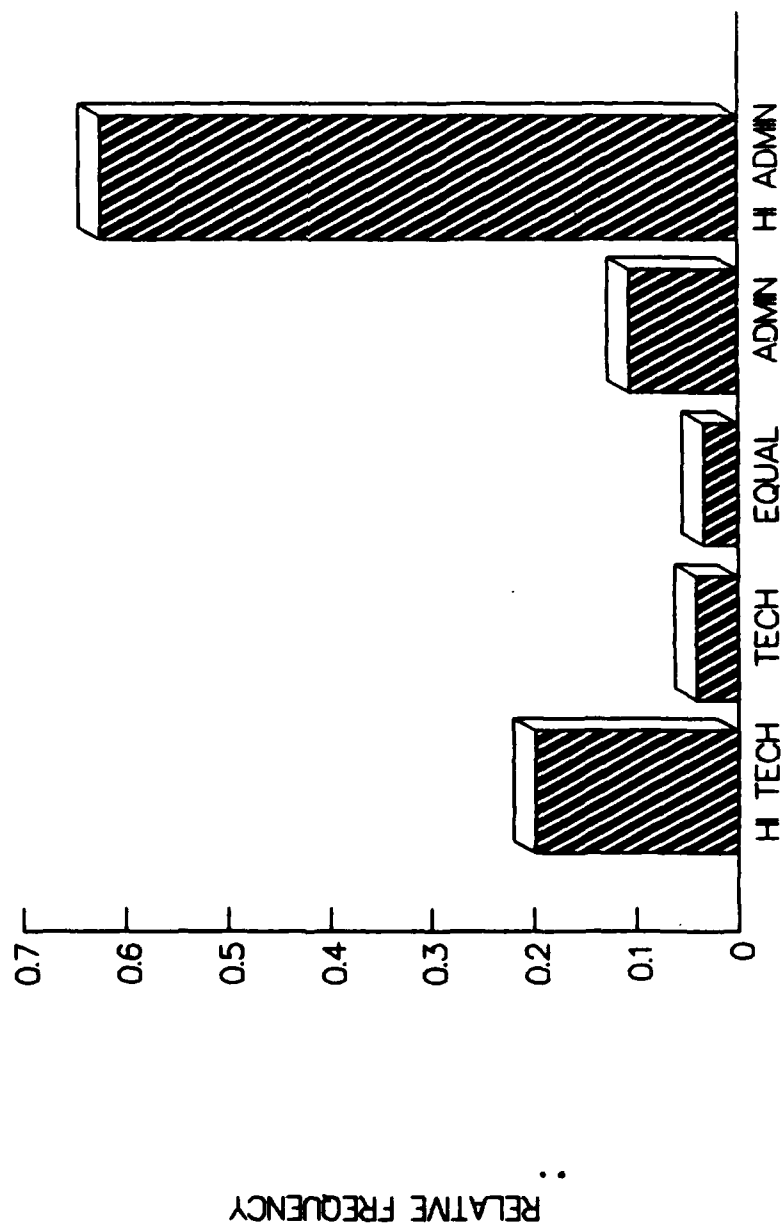


Figure 22. Worst Maintenance Officer

drastically different. Therefore, each was compared with literature findings to determine whether they supported or contradicted the literature.

Connolly's study indicated different constituencies would desire different characteristics in entry-level maintenance officers (1:216). Section 8 did not support Connolly's findings. The results of Section 8 clearly showed that each group had approximately the same desires. However, the other sections' results indicated moderate support of Connolly's study. There were no statistically significant differences between the subgroups of superiors. Among the subordinate subgroups, there were some different responses. One of the subgroups' responses more closely resembled the responses from the superiors than the other subordinates, but the other two expressed different preferences. If one considered only the larger groupings of superiors and subordinates, then there was a definite difference between the constituencies and Connolly's results were somewhat substantiated.

Expanding on Connolly's research, Tsui and Milkovich found the 'largest differences were between the two constituencies most distant in the organization hierarchy' (15:533). This suggests that the greatest differences in this thesis should have existed between the DCM and shop chief subgroups. While the Section 8 responses showed there were no differences between any of the subgroups, the other

sections again indicated partial agreement with the literature. The greatest difference was between the maintenance superintendents and the superior group. Since there was no difference between the superior subgroups, they were considered together for this comparison. As previously mentioned, the maintenance superintendent position is unique in its relationship to maintenance officers. Maintenance superintendents are subordinate to entry-level maintenance officers in terms of rank, but they occupy a position that is superior to the branch level position typically held by entry-level MOs. Therefore, it may have been incorrect to have placed them in the subordinate subgroup for the survey. They probably should not have been considered at all in this thesis. The next greatest difference was between the superiors and the shop chiefs. These two groups were the farthest apart in the base-level maintenance hierarchy. Based on these results, Tsui and Milkovich's findings were at least partially replicated in this thesis. Another Tsui study showed the implications of conflicting demands on middle managers.

In her study of the differences between superiors' and subordinates' attitudes about middle manager roles, Tsui found definite differences between the two groups (14:90). Additionally, she discovered that supervisors develop characteristics to satisfy the demands placed on them by their superiors and subordinates. According to Section 8,

there were no opposing demands imposed on entry-level maintenance officers by their superiors and subordinates. This conflicts with Tsui's findings. The other survey sections indicated some difference in what the two groups wanted from entry-level maintenance officers. The difference was the extent of technical characteristics each group preferred. While the dichotomy the author expected to find did not materialize, the difference between the superiors' and subordinates' Sections 2 through 7 responses was statistically significant.

The literature of the behavioral scientists provided much insight to the initial problem. However, when the survey results were tabulated and compared with the literature, there was little correlation between the results of this research and the experts' studies. This was probably due in large part to the survey instrument used for this research. The instrument resulted from the author's first attempt at writing a survey. It has been shown to have several shortfalls that were described in previous sections of this thesis. Therefore, one should consider these limitations before making any judgments based on the discrepancies between this research and the literature.

Comments. The results of this research seemed to indicate there was no problem with entry-level maintenance officers being torn between differing demands from superiors and subordinates. This is contrary to findings in a number

of studies by recognized experts in the behavioral sciences. Additionally, the thesis results contradict the experiences of the author and a number of other MAC entry-level maintenance officers. Appendix D contains a letter that was received from a flight line officer at a MAC base. The officer stated that because of the paperwork burden imposed on him by his superiors, he often went for weeks at a time without knowing the status of any of his aircraft. He felt he should be more involved with the technical aspects of his job but was prevented from doing so because of the administrative requirements. The officer believed as long as there was a competent NCO around to handle the technical parts of the job, he (the officer) had to concentrate on the administrative tasks. Although this is only a single case, it clearly illustrates the frustrations many entry-level maintenance officers face in MAC. The superiors' survey responses were in line with the AFR 66-1 description of maintenance officers' duties and responsibilities. If the DCMs, squadron commanders, and maintenance superintendents truly support AFR 66-1 policy, then they are not communicating their wishes to new maintenance officers. Therefore, the real problem may not be conflicting demands from superiors and subordinates, but may simply be the superiors' communication of their desires.

The final section offers some recommendations for improvements to the methodology used for this research.

Suggestions for reducing the frustrations entry-level maintenance officers encounter are included as well.

### Recommendations

The biggest problem with this study was the survey instrument itself. Any further research on this topic should incorporate a new instrument or major revisions to the existing one. The instrument should be tested more thoroughly before being sent to the field. It should be completely validated using all statistical tests the researcher plans to use in the final analyses. This would eliminate the problem of different sections producing conflicting results.

Another improvement would be to survey entry-level maintenance officers as well as the groups surveyed in this study. They should be asked what characteristics they feel their superiors and subordinates consider most important. That information could be compared with the superiors' and subordinates' responses to see how clearly the two groups' desires are communicated to the entry-level maintenance officers. Feedback could then be given to either group that expresses a preference on the survey that does not match the demands the new maintenance officers feel the group places on them.

The results of this study were somewhat inconclusive as to the extent of preferences of the groups surveyed. However, there was evidence that superiors generally did not

communicate their preference for technical abilities to entry-level maintenance officers under their control. If senior maintenance people want their new maintenance officers to develop the characteristics they value most, they must start to convey their wishes much more clearly than they are currently doing. This is the key to solving the entry-level maintenance officer's dilemma and to developing better maintenance officers.

## Appendix A: Survey Instrument

### GENERAL INFORMATION

The purpose of this questionnaire is to obtain information about the characteristics of aircraft maintenance officers. Specifically, this information is being collected in support of research for a master's thesis by a student at the Air Force Institute of Technology (AFIT).

This survey does NOT require you to identify yourself by name. The background information required is general and anonymous. Please be assured that all information you provide will be held in the strictest confidence. Your individual responses will NOT be provided to management or to any other agency. Feedback on the study will be presented only in terms of averages describing what the 'typical' response was. In addition, when the results of this study are published, readers will NOT be able to identify specific individuals or units.

Thank you for your cooperation in participating in this study. If you have any questions, please contact the researcher at the following address:

Captain Michael E. Privette  
AFIT School of Systems and Logistics  
Wright-Patterson AFB, OH 45433  
AUTOVON 785-4437



## INSTRUCTIONS

This questionnaire contains 65 items (individual 'questions'). Answer all questions directly on the questionnaire. After you have completed the entire survey, transfer all answers to the answer sheet provided. Then place the answer sheet and the survey in the return envelope and put it back in the mail. The questionnaire booklet is divided into eight sections. Sections 1, 2, 3, and 7 are in multiple choice format. You are to select only one answer in these sections.

In Section 4 you are asked to rank order items in groups of four or six. There is a space provided on the survey sheet where you are to write your selection. Here is a sample question:

Rank order the following activities, as you interpret them, from most enjoyable (1) to least enjoyable (4).

18. Pay income taxes	<u>3</u>
19. Cruise the Pacific Ocean	<u>2</u>
20. Visit your mother-in-law	<u>4</u>
21. Win a million dollars	<u>1</u>

In Section 5 you are given a five-point scale (1-5). Here is a sample:

1	2	3	4	5
Strongly agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Strongly disagree

34. Maintenance officers should have blue eyes.	<u>3</u>
35. The best maintenance officers are left-handed.	<u>2</u>

In Section 6 you are to answer 1 if you feel the statement is important. If you feel the statement is not important, answer 2. Here is a sample:

Which duties should be performed by a maintenance officer?

44. Organize squadron picnics	<u>2</u>
45. Inspect aircraft	<u>1</u>

Section 8 contains a five-point scale similar to the one in Section 5. You are asked to rate persons along the following scale:

1	2	3	4	5
Highly technically oriented		Equally technically and administratively oriented		Highly adminis- tratively oriented

Here is a sample question:

58. Think of the best maintenance supervisor for whom you have worked. Where would that person fall on the scale? 2

(The person answering the sample question felt his best maintenance supervisor was more oriented toward technical areas than administrative areas. Therefore, he chose 2.)

All answers must be transferred to the machine-scored answer sheet by filling in the appropriate spaces. If for any question you do not find a response that fits your feelings exactly, use the one that is the closest to the way you feel.

Please use a "soft-lead" (No. 2) pencil, and observe the following:

1. Make heavy black marks that fill in the space (of the response you select).
2. Erase cleanly any responses you wish to change.
3. Make no stray markings of any kind on the answer sheet.
4. Do not staple, fold, or tear the response sheet.
5. Darken only the answer portion of the response sheet. Do not fill in any other information on the response sheet.
6. Place both the answer sheet and the survey in the return envelope before putting the envelope in the mail.
7. Thank you for taking the time to answer this survey.

SECTION 1

BACKGROUND INFORMATION

This section of the survey contains several items dealing with personal characteristics. This information will be used to obtain a general picture of the background and experience of the person responding.

1. What is your current rank?
  1. Airman - TSgt
  2. MSgt - SMSgt
  3. CMSgt
  4. 2Lt - 1Lt
  5. Capt - Maj
  6. LtCol - Col
  7. Civilian
2. What position do you now hold?
  1. Shop Chief/Flight Chief
  2. Branch Chief/AMU NCOIC
  3. Maintenance Superintendent
  4. Maintenance Supervisor
  5. Squadron Commander
  6. DCM/Assistant DCM
3. How long have you been in the Air Force?
  1. Less than 5 years
  2. 5 years or more but less than 10 years
  3. 10 years or more but less than 15 years
  4. 15 years or more but less than 20 years
  5. 20 years or more but less than 25 years
  6. 25 years or more
4. How many years have you been in the aircraft maintenance field?
  1. Less than 3 years
  2. 3 years or more but less than 6 years
  3. 6 years or more but less than 9 years
  4. 9 years or more but less than 12 years
  5. 12 years or more

5. How many years have you spent in MAC?
1. Less than 3 years
  2. 3 years or more but less than 6 years
  3. 6 years or more but less than 9 years
  4. 9 years or more but less than 12 years
  5. 12 years or more
6. How long have you been in your present type of position?  
Include all time spent in similar level jobs at different  
bases or organizations within your present command.
1. Less than 6 months
  2. 6 months or more but less than 12 months
  3. 12 months or more but less than 18 months
  4. 18 months or more but less than 24 months
  5. 24 months or more but less than 36 months
  6. 36 months or more
7. Do you now hold or have you ever held an aeronautical rating?
1. Yes
  2. No
8. Which category best describes your status?
1. Enlisted
  2. Commissioned Officer with no prior enlisted time
  3. Commissioned Officer with under 4 years prior enlisted  
time
  4. Commissioned Officer with 4 or more years prior enlisted  
time
  5. Civilian

## SECTION 2

In each of the following questions, you are given two activities. Select the activity you think is the more important of the two for the entry-level aircraft maintenance officer to perform.

- 9.    1. Ensuring availability of support equipment  
      2. Knowing how to operate support equipment
- 10.   1. Understanding subordinates' training requirements  
      2. Training subordinates
- 11.   1. Briefing safety requirements  
      2. Performing safety inspections
- 12.   1. Learning technical issues of the aircraft system(s)  
      2. Learning the administrative duties of the job
- 13.   1. Resolving personnel problems  
      2. Resolving technical problems

## SECTION 3

In the following set of questions, pick the one answer that best represents your feelings.

- 14.   What should be the primary function of a maintenance officer when deployed TDY?
  - 1) Troubleshoot major aircraft system malfunctions
  - 2) Handle the paperwork requirements
  - 3) Supervise flight line work and determine maintenance work priorities
  - 4) Perform simple maintenance tasks (ie. marshalling, refueling, etc.)
  - 5) Schedule duty hours for maintenance personnel
  - 6) Act as figurehead without actually getting involved

15. On which one of the following should the maintenance officer concentrate supervisory checks?

- 1) Completed maintenance actions
- 2) In-process maintenance actions
- 3) Reports and APRs
- 4) Personnel training currency
- 5) Launching aircraft
- 6) Appearance of personnel (AFR 35-10)

16. Which of the following is the most important for the maintenance officer to do?

- 1) Perform aircraft maintenance work and understand administrative work
- 2) Perform aircraft maintenance work and perform administrative work
- 3) Perform administrative work and understand aircraft maintenance work
- 4) Understand administrative work and understand aircraft maintenance work

#### SECTION 4

In the following four groups of questions, rank order the listed duties of an entry-level aircraft maintenance officer from what you feel is the most important (1) to the least important (4). Rank each group separately.

##### Group 1- Questions 17-20

- |  |      |
|--|------|
| 17. Troubleshoot aircraft maintenance problems | ---- |
| 18. Write/edit APRs, reports, etc.             | ---- |
| 19. Schedule maintenance activities            | ---- |
| 20. Attend meetings                            | ---- |

##### Group 2- Questions 21-24

- |   |      |
|---|------|
| 21. Perform Quality Assurance inspections on work     | ---- |
| 22. Answer Quality Assurance reports                  | ---- |
| 23. Monitor training status                           | ---- |
| 24. Ensure availability of proper tools and equipment | ---- |

##### Group 3- Questions 25-28

- |                                       |      |
|---------------------------------------|------|
| 25. Evaluate maintenance data reports | ---- |
| 26. Administer recognition programs   | ---- |
| 27. Prepare assorted paperwork        | ---- |
| 28. Perform simple maintenance tasks  | ---- |

##### Group 4- Questions 29-32

- |  |      |
|--|------|
| 29. Direct maintenance activities                          | ---- |
| 30. Provide personal administrative expertise to superiors | ---- |
| 31. Provide personal technical expertise to superiors      | ---- |
| 32. Direct administrative activities                       | ---- |

In the following questions, rank order the possible experiences/ backgrounds of an entry-level maintenance officer from what you would most prefer (1) to what you would least prefer (6).

- |   |      |
|---|------|
| 33. Prior enlisted aircraft maintenance | ---- |
| 34. Prior enlisted aircrew member       | ---- |
| 35. Prior enlisted other                | ---- |
| 36. Prior officer aircrew member        | ---- |
| 37. Officer cross trainee (non-aircrew) | ---- |
| 38. No prior experience necessary       | ---- |

## SECTION 5

This section of the questionnaire contains a number of statements describing the duties of an entry-level aircraft maintenance officer. Use the rating scale provided to show the extent to which you agree or disagree with the statements shown.

	1	2	3	4	5
	Strongly agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Strongly disagree
39. A maintenance officer should concentrate on handling technical problems more than people problems.					----
40. A maintenance officer should understand administrative procedures better than technical information (i.e. aircraft systems).					----
41. A maintenance officer should spend more time supervising maintenance activities than doing paperwork.					----
42. A maintenance officer should develop new maintenance techniques rather than develop new administrative policies.					----
43. A maintenance officer should demonstrate technical competence by briefing aircraft status instead of speaking at ceremonial events (i.e. banquets, tours).					----
44. A maintenance officer should concentrate on writing administrative reports (APRs, awards and decorations) instead of technical reports (QA reports, MOIs).					----
45. A maintenance officer should handle people problems better than technical problems.					----
46. The primary function of a maintenance officer is to look after the morale of personnel and handle duties like CFC instead of managing maintenance actions.					----
47. A maintenance officer should be a contact point for flying operations and upper maintenance management instead of acting as a technical advisor to those people.					----
48. A maintenance officer is principally responsible for maintenance activities instead of administrative activities.					----



## SECTION 6

Maintenance officers have to meet certain requirements to be upgraded to the fully qualified AFSC. The following is a list of activities that may or may not be important for a maintenance officer to be capable of performing prior to upgrade. Mark (1) for those activities you feel are important and (2) for those activities you feel are not important for upgrade.

- 49. Operate support equipment (power units, light carts) ----
- 50. Perform simple maintenance tasks (marshalling, refueling) ----
- 51. Complete an academic technical course on the assigned weapon system ----
- 52. Complete a hands-on technical course on the assigned weapon system ----
- 53. Complete a supervisor's course ----
- 54. Complete an effective writing course ----
- 55. Be experienced at coordinating flight line launch activities ----
- 56. Understand and use the Technical Order system and relevant Technical Orders ----
- 57. Understand in detail how the supply system works ----
- 58. Have an in-depth knowledge of aircraft scheduling ----
- 59. Know how to properly document aircraft forms ----

## SECTION 7

In the following set of questions, select the one answer that best represents your feelings.

60. What academic education produces better maintenance officers?
- 1) Administrative/ Business/ Management
  - 2) Engineering/ Science/ Technical
  - 3) Liberal Arts (Music, Art, History, etc.)
  - 4) Academic education not important
61. Which of the following types of training is most important for a maintenance officer?
- 1) General aircraft systems course
  - 2) Report writing and briefing course
  - 3) In-depth technical training on the assigned weapon system
  - 4) Training on Air Force and Command Regulations
  - 5) Formal management training

## SECTION 8

Using the rating scale provided, select the answer (1 to 5) that most closely represents your feelings about the abilities and characteristics of an entry-level maintenance officer. If you most strongly agree with the statement on the left, select (1). If you most strongly agree with the statement on the right, select (5).

1	2	3	4	5
Highly technically oriented		Equally technically and administratively oriented		Highly adminis- tratively oriented

62. Think of the best maintenance officer you have known.  
 Where would that person fall on the scale? -----
63. Think of the worst maintenance officer you have known.  
 Where would that person fall on the scale? -----
64. Think about the maintenance officer(s) with whom you  
 now work. (If you work with more than one, consider  
 the one who most stands out in your mind.) Where  
 would that person fall on the scale? -----
65. Finally, where do you feel the ideal maintenance  
 officer should fall on the scale? -----

Appendix B: Analysis of Variance for Section 8 Questions

BEST MAINTENANCE OFFICER

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: BEST

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE
MODEL	5	1.70059112	0.34011822	0.46
ERROR	165	121.24677730	0.73482895	PR > F
CORRECTED TOTAL	170	122.94736842		0.8035

R-SQUARE	C.V.	ROOT MSE	BEST MEAN
0.013832	31.9357	0.85722165	2.68421053

$F_{.05} = 2.21$        $F(\text{critical}) > F(\text{calculated})$   
 Therefore: Unable to reject null hypothesis that there  
 is no difference between treatment means

IDEAL MAINTENANCE OFFICER

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: IDEAL

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE
MODEL	5	2.50342354	0.50068471	1.03
ERROR	166	80.90936716	0.48740583	PR > F
CORRECTED TOTAL	171	83.41279070		0.4033

R-SQUARE	C.V.	ROOT MSE	IDEAL MEAN
0.030012	26.0479	0.69814456	2.68023256

$F_{.05} = 2.21$        $F(\text{critical}) > F(\text{calculated})$   
 Therefore: Unable to reject null hypothesis that there  
 is no difference between treatment means

WORST MAINTENANCE OFFICER  
GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: WORST

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE
MODEL	5	26.08878889	5.21775778	2.02
ERROR	165	425.57202982	2.57922442	PR > F
CORRECTED TOTAL	170	451.66081871		0.0780

R-SQUARE	C.V.	ROOT MSE	WORST MEAN
0.057762	41.3592	1.60599640	3.88304094

$F_{.05} = 2.21$        $F(\text{critical}) > F(\text{calculated})$   
 Therefore: Unable to reject null hypothesis that there  
 is no difference between treatment means

### Appendix C: Chi Square Tests

This appendix contains chi square tests that were not presented in the body of the thesis. However these tests were used to analyze some of the survey results.

#### Shop Chiefs vs Superiors

$H_0$ : There is no difference in preference for technical or administrative ability between shop chiefs and superiors.

$H_a$ : There is a difference in preference between the two groups.

Significance Level: 0.05, with 1 degree of freedom

Critical Test Value: 3.84

Calculated Value: 17.95

Therefore: Since the calculated value is greater than the critical value, the null hypothesis is rejected.

#### Shop Chiefs vs DCMs

$H_0$ : There is no difference in preference for technical or administrative ability between shop chiefs and DCMs.

$H_a$ : There is a difference in preference between the two groups.

Significance Level: 0.05, with 1 degree of freedom

Critical Test Value: 3.84

Calculated Value: 9.82

Therefore: Since the calculated value is greater than the critical value, the null hypothesis is rejected.

#### Shop Chiefs vs Squadron Commanders

$H_0$ : There is no difference in preference for technical or administrative ability between shop chiefs and squadron commanders.

$H_a$ : There is a difference in preference between the two groups.

Significance Level: 0.05, with 1 degree of freedom

Critical Test Value: 3.84

Calculated Value: 11.02

Therefore: Since the calculated value is greater than the critical value, the null hypothesis is rejected.

#### Shop Chiefs vs Maintenance Supervisors

$H_0$ : There is no difference in preference for technical or administrative ability between shop chiefs and maintenance supervisors.

$H_a$ : There is a difference in preference between the two groups.

Significance Level: 0.05, with 1 degree of freedom

Critical Test Value: 3.84

Calculated Value: 10.06

Therefore: Since the calculated value is greater than the critical value, the null hypothesis is rejected.

#### Shop Chiefs vs Maintenance Superintendents

$H_0$ : There is no difference in preference for technical or administrative ability between shop chiefs and maintenance superintendents.

$H_a$ : There is a difference in preference between the two groups.

Significance Level: 0.05, with 1 degree of freedom

Critical Test Value: 3.84

Calculated Value: 0.59

Therefore: Since the calculated value is less than the critical value, the null hypothesis can not be rejected.

#### Shop Chiefs vs Branch Chiefs

$H_0$ : There is no difference in preference for technical or administrative ability between shop chiefs and branch chiefs.

$H_a$ : There is a difference in preference between the two groups.

Significance Level: 0.05, with 1 degree of freedom

Critical Test Value: 3.84

Calculated Value: 3.27

Therefore: Since the calculated value is less than the critical value, the null hypothesis can not be rejected.

#### Shop Chiefs vs Combined Maintenance Superintendents and Branch Chiefs

$H_0$ : There is no difference in preference for technical or administrative ability between shop chiefs and the combined group of branch chiefs and maintenance superintendents.

$H_a$ : There is a difference in preference between the two groups.

Significance Level: 0.05, with 1 degree of freedom

Critical Test Value: 3.84

Calculated Value: 0.56

Therefore: Since the calculated value is less than the critical value, the null hypothesis can not be rejected.

#### Branch Chiefs vs Superiors

$H_0$ : There is no difference in preference for technical or administrative ability between branch chiefs and superiors.

$H_a$ : There is a difference in preference between the two groups.

Significance Level: 0.05, with 1 degree of freedom

Critical Test Value: 3.84



Calculated Value: 4.07

Therefore: Since the calculated value is greater than the critical value, the null hypothesis is rejected.

#### Branch Chiefs vs DCMs

H<sub>0</sub>: There is no difference in preference for technical or administrative ability between branch chiefs and DCMs.

H<sub>a</sub>: There is a difference in preference between the two groups.

Significance Level: 0.05, with 1 degree of freedom

Critical Test Value: 3.84

Calculated Value: 2.38

Therefore: Since the calculated value is less than the critical value, the null hypothesis can not be rejected.

#### Branch Chiefs vs Squadron Commanders

H<sub>0</sub>: There is no difference in preference for technical or administrative ability between branch chiefs and squadron commanders.

H<sub>a</sub>: There is a difference in preference between the two groups.

Significance Level: 0.05, with 1 degree of freedom

Critical Test Value: 3.84

Calculated Value: 2.38

Therefore: Since the calculated value is less than the critical value, the null hypothesis can not be rejected.

#### Branch Chiefs vs Maintenance Supervisors

H<sub>0</sub>: There is no difference in preference for technical or administrative ability between branch chiefs and maintenance supervisors.

H<sub>a</sub>: There is a difference in preference between the two groups.

Significance Level: 0.05, with 1 degree of freedom

Critical Test Value: 3.84

Calculated Value: 2.60

Therefore: Since the calculated value is less than the critical value, the null hypothesis can not be rejected.

#### Branch Chiefs vs Maintenance Superintendents

H<sub>0</sub>: There is no difference in preference for technical or administrative ability between branch chiefs and maintenance superintendents.

H<sub>a</sub>: There is a difference in preference between the two groups.

Significance Level: 0.05, with 1 degree of freedom

Critical Test Value: 3.84

Calculated Value: 5.75

Therefore: Since the calculated value is greater than the critical value, the null hypothesis is rejected.

#### Branch Chiefs vs Combined Maintenance Superintendents and Shop Chiefs

H<sub>0</sub>: There is no difference in preference for technical or administrative ability between branch chiefs and the combined group of maintenance superintendents and shop chiefs.

H<sub>a</sub>: There is a difference in preference between the two groups.

Significance Level: 0.05, with 1 degree of freedom

Critical Test Value: 3.84

Calculated Value: 5.69

Therefore: Since the calculated value is greater than the critical value, the null hypothesis is rejected.

#### Maintenance Superintendents vs Superiors

$H_0$ : There is no difference in preference for technical or administrative ability between maintenance superintendents and superiors.

$H_a$ : There is a difference in preference between the two groups.

Significance Level: 0.05, with 1 degree of freedom

Critical Test Value: 3.84

Calculated Value: 21.25

Therefore: Since the calculated value is greater than the critical value, the null hypothesis is rejected.

#### Maintenance Superintendents vs DCMs

$H_0$ : There is no difference in preference for technical or administrative ability between maintenance superintendents and DCMs.

$H_a$ : There is a difference in preference between the two groups.

Significance Level: 0.05, with 1 degree of freedom

Critical Test Value: 3.84

Calculated Value: 12.83

Therefore: Since the calculated value is greater than the critical value, the null hypothesis is rejected.

#### Maintenance Superintendents vs Squadron Commanders

$H_0$ : There is no difference in preference for technical or administrative ability between maintenance superintendents and squadron commanders.

$H_a$ : There is a difference in preference between the two groups.

Significance Level: 0.05, with 1 degree of freedom

Critical Test Value: 3.84

Calculated Value: 14.23

Therefore: Since the calculated value is greater than the critical value, the null hypothesis is rejected.

#### Maintenance Superintendents vs Maintenance Supervisors

$H_0$ : There is no difference in preference for technical or administrative ability between maintenance superintendents and maintenance supervisors.

$H_a$ : There is a difference in preference between the two groups.

Significance Level: 0.05, with 1 degree of freedom

Critical Test Value: 3.84

Calculated Value: 13.05

Therefore: Since the calculated value is greater than the critical value, the null hypothesis is rejected.

#### Maintenance Superintendents vs Combined Branch Chiefs and Shop Chiefs

$H_0$ : There is no difference in preference for technical or administrative ability between maintenance superintendents and the combined group of branch chiefs and shop chiefs.

$H_a$ : There is a difference in preference between the two groups.

Significance Level: 0.05, with 1 degree of freedom

Critical Test Value: 3.84

Calculated Value: 3.03

Therefore: Since the calculated value is less than the critical value, the null hypothesis can not be rejected.

Appendix D: Letter from Flight Line Branch  
Maintenance Officer

This questionnaire was difficult to answer for the following reasons:

I couldn't keep from answering the questions from two different points of view. One point of view I was answering from was what I feel a competent and efficient maintenance officer SHOULD know and SHOULD be performing. I feel a MO should be more involved with maintenance activities, trained more in-depth on aircraft systems, etc..

But the realities are different. A MO with good senior NCOs working under him soon learns that he can still manage his branch rather well without even stepping on the flight line (or the shop), even though this is not recommended. he soon learns that the NCOs can take care of all the maintenance production, and left alone they will do a good job. Those MOs with poor NCOs working for them get caught behind the power curve almost immediately. I have experienced this unfortunate truth when I first started out.

Unfortunately, the administrative aspect is by far the largest part of my job. I feel very sad in saying this, but there have been many weeks at a time when I did not know the status nor schedule of any of my airplanes AT ALL because I was so swamped with paperwork.

This paperwork includes QA'ing APRs, writing indorsements, awards, answering 2419s, writing policy letters, counseling individuals, working the tons of daily distribution that can't be delegated, writing APRs, attending meeting after meeting after meeting, doing all those 'lieutenant projects,' QA'ing more APRs (My commander demands quality APRs and decorations coming from all branches. I must proof, edit, and coordinate 15 APRs/week, not to mention rewriting dozens of indorsements each week), training, proofing orders, etc..

I have gotten much better at managing the paperwork, and as a result, I've gotten much better at keeping up with the maintenance, like I'm SUPPOSED TO. My days are starting to get shorter too. While answering your survey I tried to put down what a maintenance officer should be, but I'm afraid that my answers may have been contaminated by what a maintenance officer actually is. Please keep in mind that my viewpoint is from that of having only one job so far, (at the same duty location since AMOC. I have no prior experience..).

Signed

[Any spelling errors were corrected. Punctuation was not changed.]

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[REDACTED] [REDACTED]  
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The purpose of this study was to determine whether Military Airlift Command (MAC) aircraft maintenance personnel prefer entry-level maintenance officers to possess more technical or administrative characteristics. The study had three primary objectives. First was to determine whether MAC maintenance personnel as a group prefer entry-level maintenance officers to possess more technical or administrative characteristics. The second objective was to determine if entry-level maintenance officers' superiors and subordinates value different characteristics. The final objective was to determine if the preference for technical or administrative characteristics varied among several subgroups. Surveys were sent to DCMs, maintenance squadron commanders, maintenance supervisors, maintenance superintendents, branch chiefs, and shop/flight chiefs.

Analyses of the surveys led to conflicting conclusions. Problems with the survey instrument made the results somewhat questionable. The most reliable section of the survey showed there was no difference in the preferences of any of the groups. All groups favored maintenance officers who were slightly more technically than administratively oriented. Other survey sections indicated varying degrees of preference for technical characteristics between the groups with one group demonstrating no preference. *The 100, 11*

Recommendations included improving the survey instrument and surveying entry-level maintenance officers themselves as well as the original groups. Additionally, senior base-level maintenance officers should communicate their wishes for technical proficiency to entry-level maintenance officers under their control. This would lessen the frustration new MAC maintenance officers face since many senior officers seem to be emphasizing administrative duties at the expense of technical competence.

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